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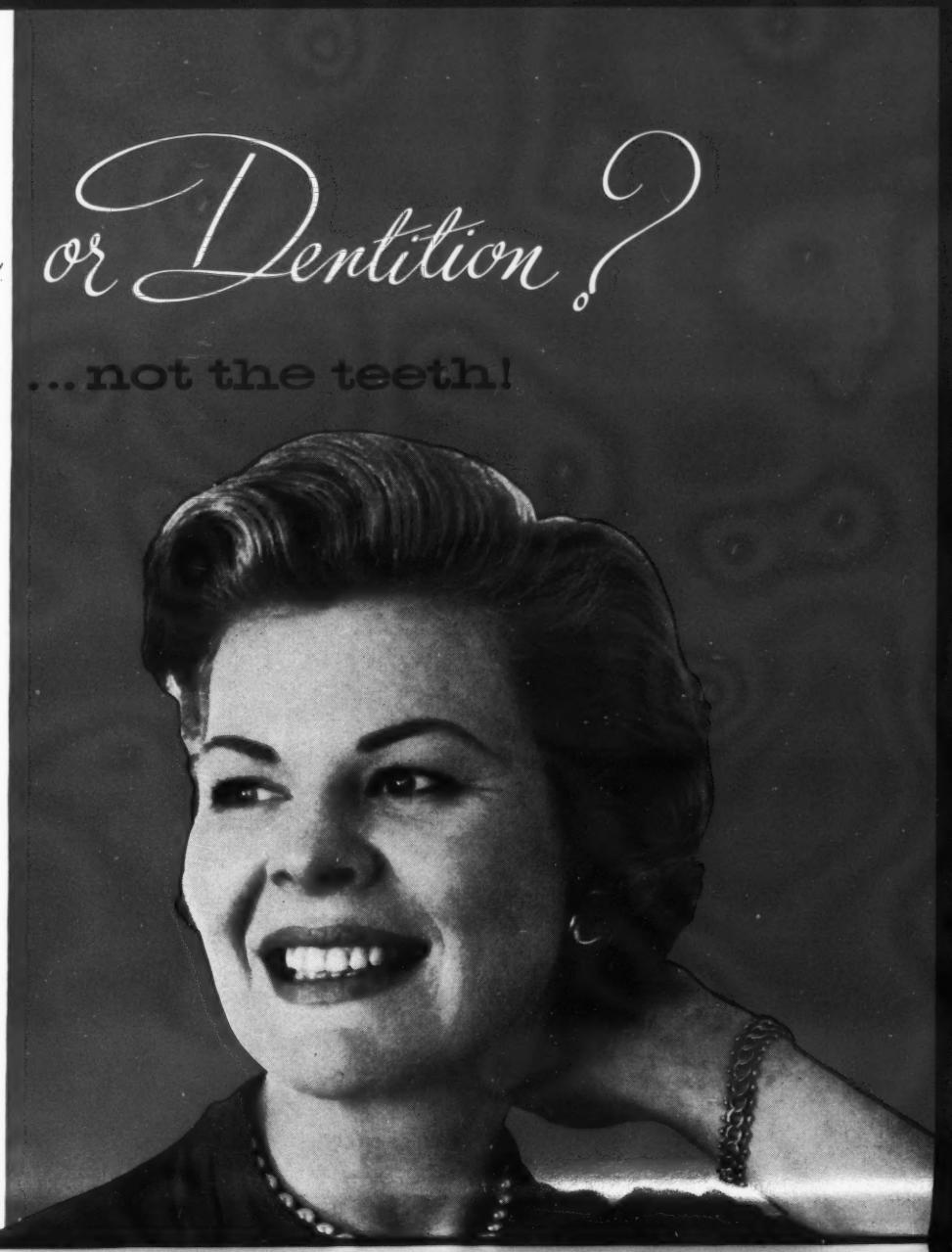
Denture – or Dentition?

...you notice the smile ...not the teeth!



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About Our CONTRIBUTORS

LEO H. ROPER, D.D.S. (New York University, College of Dentistry, 1929) emphasizes perioprosthodontia in his practice and is head of the department of periodontia at Mount Sinai Hospital. Doctor Roper's co-author, MORTON ROSENBLUTH, B.A. (New York University, 1943), D.D.S. (New York University, College of Dentistry, 1946) limits his practice to periodontia. Their first article to appear in DIGEST is THE RATIONALE OF PERIOPROSTHODONTIA.

KOUWENHOVEN, W. B., E. E., 1906; M.E., 1907 (Polytechnic Institute, Brooklyn, New York); Dipl. Ing., 1913, Dr. Ing., 1914 (Karlsrugh Technische Hochschule, Baden, Germany), and his co-authors, JAMES R. JUDE, B.S. (University of Minnesota, 1951), M.D. (University of Minnesota, 1953), and G. GUY KNICKERBOCKER, B.S. (Johns Hopkins University, 1954), M.S.E. (Johns Hopkins University, 1958) are members of the staff of the Johns Hopkins Hospital in Baltimore. Doctor Kouwenhoven has to his credit 54 years of teaching and research experience in the fields of electrical engineering and the effects of electricity on the human body, and has published more than 100 articles. His title in the current issue is A SIMPLE METHOD OF CARDIAC RESUSCITATION.

Capt. HENRY A. COLLETT (DC) U.S.N., Ret., D.D.S. (Temple University, School of Dentistry, 1939) has been a contributor to DIGEST since 1951 and has published liberally in other journals as well. Captain Collett presents in this issue the first installment of a two-part article, THE INCISAL RELATIONSHIP IN THE HUMAN DENTITION.

JOSEPH RUBINSTEIN, D.D.S. (University of Illinois, 1944) will be remembered by DIGEST readers for his previous article, published in October 1959. This month he presents another practical article, THE DISPLACEMENT OF TISSUE IN ELASTIC IMPRESSION PROCEDURE.

ROBERT A. ATTERBURY, B.S., D.D.S. (University of Illinois, College of Dentistry, 1942) is Clinical Assistant Professor of Oral and Maxillofacial Surgery, University of Illinois, Research and Educational Hospitals and is a frequent contributor to DIGEST. His collaborator, SUNDER J. VAZIRANI, D.D.S. (University of Bombay, College of Dentistry, 1952), M.S. (University of Illinois, 1959) who is now in permanent practice in Patiola, Punjab, India, is also a former contributor. In the current issue they present THE UNERUPTED PALATAL CUSPID.

EDWARD J. RYAN, B.S., D.D.S., Editor
WANDA T. PICKARD, B.A., Assistant Editor
708 Church Street, Evanston, Illinois

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The Rationale of PERIOPROSTHODONTIA

LEO H. ROPER, D.D.S.*, New York,
and MORTON ROSENBLUTH, B.A., D.D.S.**, North Miami Beach, Florida

DIGEST

Perioprosthodontia combines in a single approach all the necessary periodontal, operative, and prosthetic procedures available in restorative dentistry. Periodontal procedures include all phases of periodontal therapy from scaling of teeth and subgingival curettage to mucogingival and osseous surgery. Operative and prosthetic procedures include all phases from a Class II inlay or amalgam to complete occlusal reconstruction. This report deals largely with cases in the final stage of breakdown both of the teeth and periodontal structures, but where the prognosis may be considered hopeful for a limited period of time.

Typical Dental Situations

The patient in need of extensive reconstructive dentistry is usually middle-aged or older (50-65)[1] and presents a typical picture:

(1) Usually a number of teeth are missing or have been replaced in a manner no longer satisfactory.

(2) The remaining teeth have been restored many times and are apt to be unsightly, while the supporting structures are in various stages of degeneration.[2]

A report on the epidemiology of periodontal disease reveals that after the age of 45, almost everyone has some degree of alveolar bone loss. Periodontal pockets are present in 94 per cent of the cases examined, and suppuration, either spontaneous or evident upon digital pressure, is present in over half of the cases observed.[3]

Rationale of Perioprosthodontia

Since these patients need both periodontal and reconstructive treatment, it is an advantage to carry them out at the same time. Obviously it is difficult to scale and curet deep pockets between bell-shaped teeth and under old restorations and pontics, and in carious areas. Accessibility and visibility are enhanced in reconstructive dentistry because the crowns of the teeth are reduced and the interproximal spaces are opened. A better result may be anticipated if periodontal irregularities are corrected at the time of preparation, and under the same anesthesia.

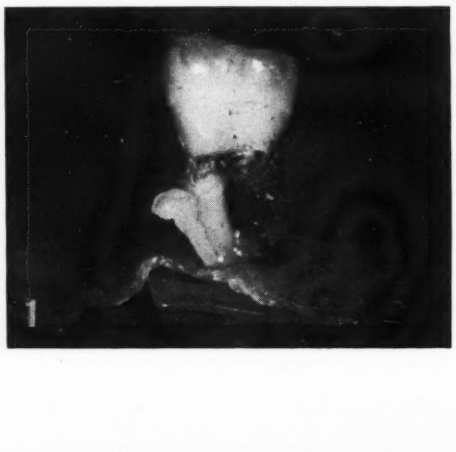
Procedures for Perioprosthodontia

The following measures should be carefully completed:

Scaling of Teeth and Instruction in Home Care—The elimination of gross irritants will, as a rule, improve the oral environment. This facilitates future treatment since the gingivae will be less hyperemic and tender.[4] It is essential to institute education in home care as soon as possible and to continue it throughout treatment. The patient must be impressed with the importance of his responsibility in bringing about a cure and consistency in maintaining oral health.

Preliminary Preparation of Abutments and Complete Periodontal Corrections—For patients requiring extensive dentistry, full medical histories are recorded and attending physicians consulted prior to treatment. When a patient presents unfavorable physical or psychologic symptoms, the procedures must be modified and all necessary precautions taken.

Long Treatment Periods Favored—Appointments are usually scheduled for periods of three hours or longer. The best results are obtained when visits are few in number but each of long duration.



1.
Heavy tenacious incrustations on a molar lost because of periodontal involvement. The removal of these deposits when hidden by gingival tissue represents one of the most difficult procedures in dentistry.

*Chief, Periodontia Section, Mount Sinai Hospital, New York.
**Formerly Periodontist, Mount Sinai Hospital, New York Polyclinic Medical School and Hospital, New York. At present, Periodontist, Mount Sinai Hospital, Miami Beach, Florida.

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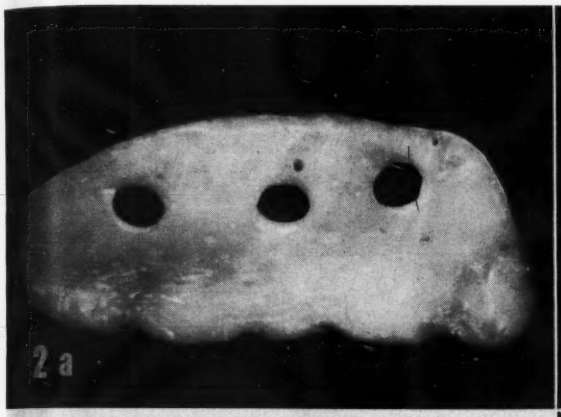
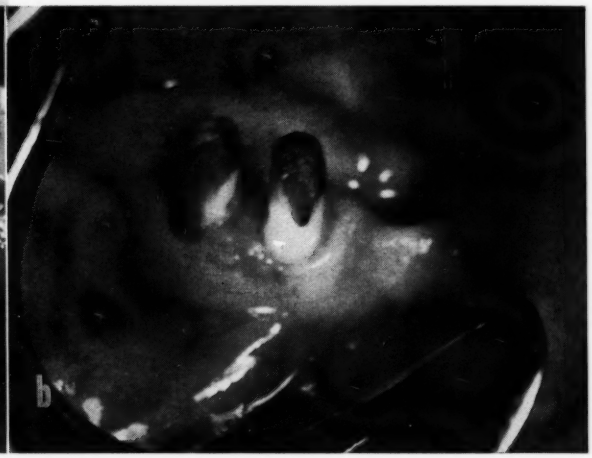


2.
Acrylic stent built as an extension of the temporary bridge for mucobuccal surgery. (A) Buccal view. The holes further help to retain the periodontal pack. (B) Lingual view. Metal bands fitted to the preparations assure long-lasting accurate margins. (C) The appliance in place retaining the pack and preventing the reattachment of the thick, heavy, mucobuccal tissue. The stent part of the temporary bridge can be ground off when the pack is no longer necessary.

3.
(A) Teeth were roughly prepared and excess gingival tissue removed and recontoured (gingivectomy and gingivoplasty). Crowns were painted with silver nitrate before temporary splint was cemented. (B) Newly positioned gingiva. Note clean exposed root surfaces.



Procedural Steps

1. *Premedication*—The patient is premedicated with Sodium Seconal® (1½ grains) given a few minutes before being seated in the dental chair. Piercing the capsule at each end with a hot explorer results in faster action. A topical anesthetic is applied to the site of injection, and 1½ cubic centimeters of 1:50,000 Xylocaine® (lidocaine hydrochloride) is injected. While waiting for complete anesthesia, a wax or alginate impression of the area is taken and is put aside. This is to be used later for the fabrication of the temporary bridge or splint.

2. *Preparation of Teeth*—The involved teeth are roughly prepared for the subsequent abutments. The old restorations and crowns are removed, caries removed, crowns reduced, and interproximal spaces widened. Hopelessly degenerated teeth are extracted. In order to ensure a clean, nontraumatized socket, and afford complete access and visibility while operating, the crowns of the teeth to be extracted are first cut down to the gingiva. When all other procedures are completed, and immediately prior to the cementation of the temporary bridge, the roots are separated and removed.

3. *Periodontal Measures*—At this

time, prior to the insertion of the temporary bridge, the necessary periodontal procedures are performed. With the area free of old pontics, restorations, caries, and the crowns of the teeth reduced and tapered, visibility and access are perfect. It is easy to *see* any remaining calculus deposits under the gingivae which can be completely removed if care is taken to dry the area thoroughly and examine it closely.

4. *Removal of Calculus* — Even when deposits are clearly seen removal is extremely difficult. Roots are concave and unfortunately, periodontal instruments are designed for convex surfaces. Calculus adheres tenaciously to crevices in the roots[5], and it is almost impossible to remove these deposits from areas beneath old pontics, overhanging restorations, and in deep pockets between bell-shaped teeth further complicated by caries (Fig. 1).

5. *Other Procedures Can Be Completed*—If they are indicated, gingivectomies, gingivoplasties, osteoplasties, frenectomies, vestibular deepenings, and other necessary periodontal corrections may be made at this time with greater ease and efficiency.[6, 7, 8, 9]

6. *Temporary Bridges and Splints* —These are completed in fast curing acrylic. To attain sturdier, better fitting, and longer lasting margins on the temporary bridge, copper, gold, or poly-vinyl bands are carefully fitted, and festooned about the gingival margins of each abutment.[10]

7. *Uses of Temporary Bridges*—(1) Not only does the temporary bridge or splint serve as a temporary cover, but it can help retain the surgical pack. This is accomplished by leaving some of the excess flash of the acrylic so that it covers the gingival areas operated on. (2) After frenectomies and vestibular deepenings, a stent can be built directly on the temporary splint or bridge. This maintains the pack in a position high enough to prevent adhesions in the newly created vestibule (Fig. 2). (3) The acrylic temporary restorations are cemented, using one of the newer cements for this purpose, and the periodontal pack placed.

8. *Concluding Steps*—At the next appointment, usually one week later, (1) the splints are removed, (2) the area debrided, and (3) the splints recemented. The pack is replaced, and another section of the mouth is prepared. This routine is continued until the entire mouth has been completed.

Final Preparations and Impressions

The first area operated on is by this time completely healed. The newly positioned gingivae are now fully established and it is safe to finish the preparations to this new gingival line (Fig. 3). All pockets have been eliminated and the gingiva is resting on and is being supported by the underlying alveolar bone. Imprints of the completed preparations are taken and the case is completed in the usual manner (Fig. 4). Note that in relatively few visits all the necessary operative, surgical, and periodontal corrections are completed thoroughly and efficiently (Fig. 5).

Common Indications for Perioprosthodontia

Lengthening of Short Clinical Crowns—When these crowns are to be used as abutments either in fixed restorations or in partial dentures they may be lengthened. Due to excess attrition or anatomic abnormality, the abutment teeth are frequently too short for adequate retention. Gingivectomy or gingivoplasty procedures are indicated as a means of lengthening the clinical crowns (Fig. 6).

Correction of Fibrotic Tissue—This tissue is usually present at the proximal surface adjacent to the edentulous ridge. This heaped up gingival tissue is a common phenomenon and creates a problem for the proper seating of the anterior portion of the saddle or pontic. If not corrected, this fibrotic tissue becomes irritated and edematous. This situation is relieved by performing gingivoplasty at the time of the tooth preparation. This results in a longer, more retentive abutment.

Elimination of Gingival Craters or Evaginated Papillae—This condition results in a lack of esthetics and also creates areas of food impaction. The condition is corrected by means of gingivoplasty or, when necessary, osteoplasty. The bone and gingiva are recontoured so that the height of the papilla is once more interproximal. This architectural improvement can also be accomplished at the time of tooth preparation.

Salvaging Strategic Roots — This measure often means the difference between fixed and removable bridgework or between partial appliances and full dentures. It is not uncommon to find such teeth or roots broken down or carious up to and below the gingival margins. If the remaining usable root is so far below the gingiva as to encroach upon the alveolar bone, it is necessary not only to remove the overlying gingiva, but also some of the alveolar bone. Provision must be made for future gingiva which will have to occupy space. If there is insufficient room for the new tissue it will become inflamed, cyanotic, and hypertrophied. It is assumed that the root so involved must have sufficient bony support and successful root canal treatment to be eligible for such treatment (Fig. 7).

Former Concepts of Treatment Modified

Once the rationale of treating both the teeth and the supporting tissues at the same time is accepted, it becomes necessary to alter the older concepts of tooth preparation and reconstruction: (1) In cases requiring perioprosthodontic treatment, the clinical crowns no longer correspond to the anatomic crowns.[11] The clinical crowns are now much longer because part of the root is exposed. (2) It is necessary, wherever possible, to cover these root surfaces with the restorations; failure to do so often results in caries. The exposed root surfaces have many root concavities and the preparations must follow these irregularities.

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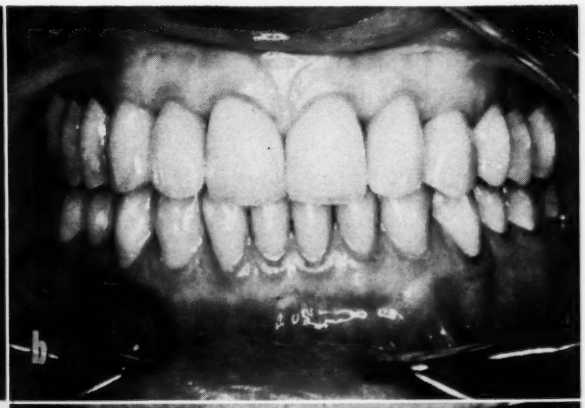
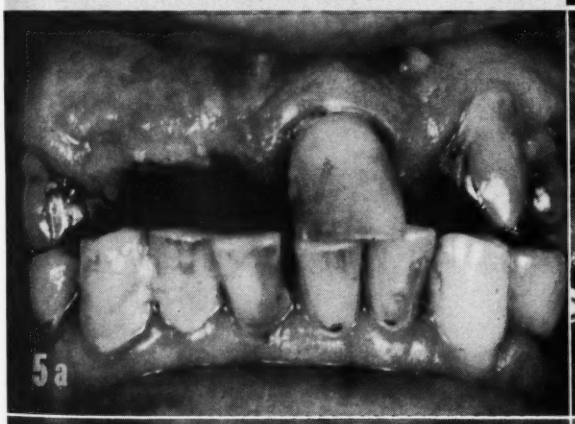
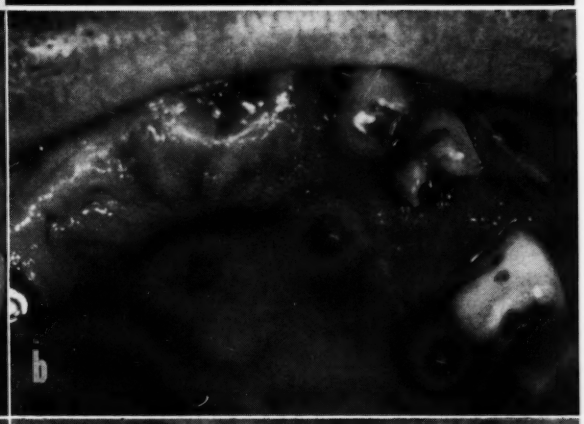


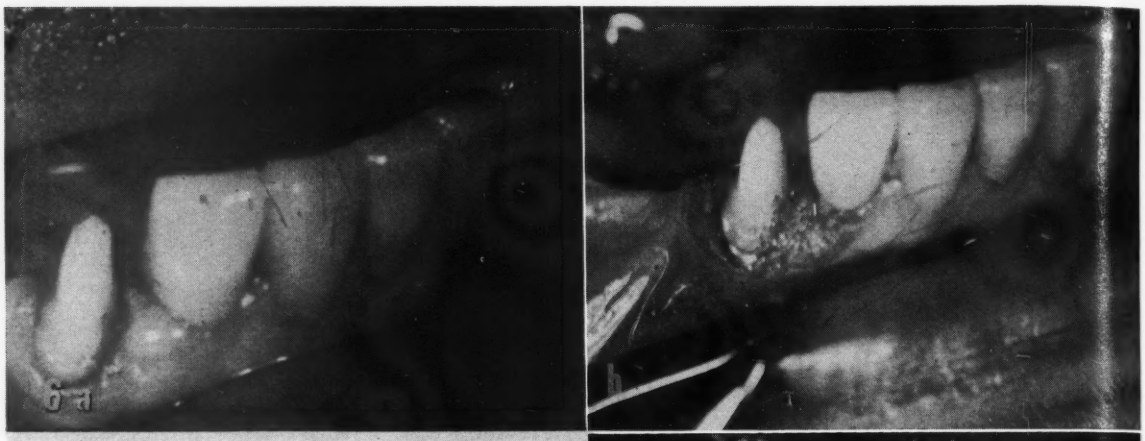
4.
(A) Teeth abraded and sensitive. Cusps so worn as to make function difficult. Periodontal pockets are present and alveolar bone is involved. (B) and (C) Periodontal corrections completed, and esthetics and function restored.

5.
(A) Typical case in need of full occlusal restoration. (B) Quadrant therapy. Upper left quadrant completed in one visit. Old restorations and bridges were removed, caries removed, teeth prepared, and central incisor extracted. Gingival pockets were eliminated by gingivectomy and gingivoplasty. (C) Preparations finished and imprints taken after periodontal tissues had thoroughly healed. (D) Mouth completely restored in relatively few visits.

Note: Interproximal spaces are rebuilt in order to accommodate the gingival papillae. The wide necks of the restorations are necessary to avoid future food impactions.

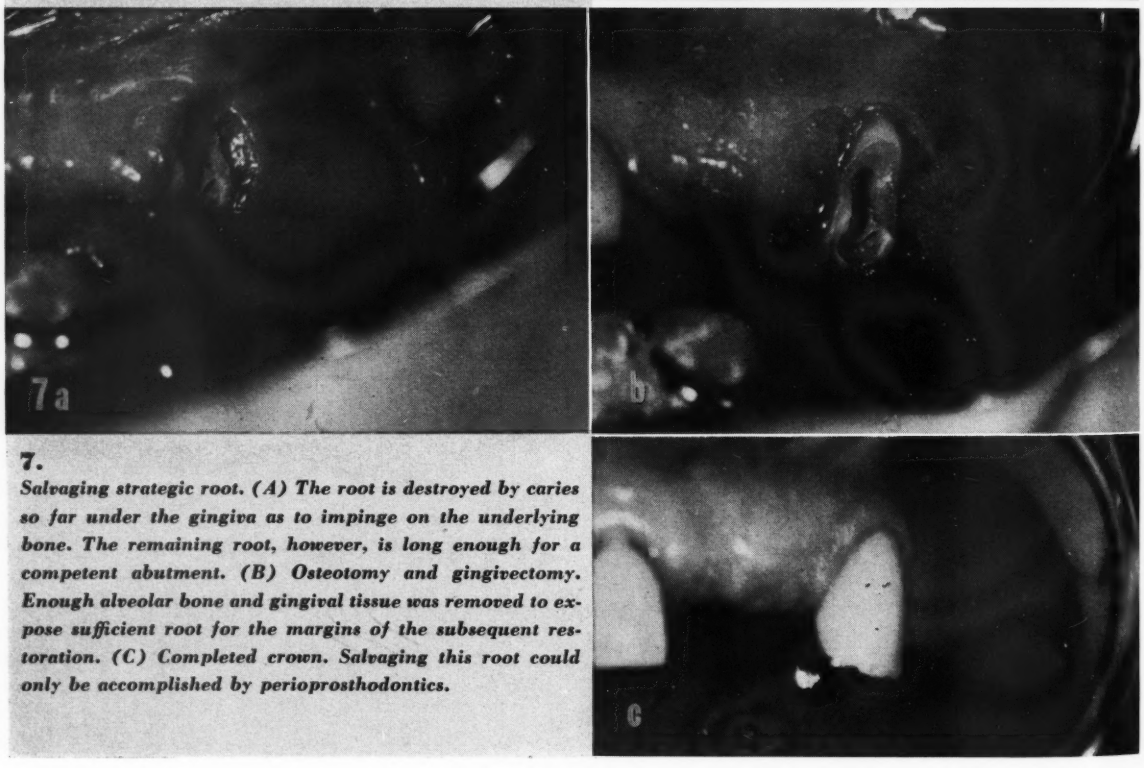






6.

Lengthening of short tooth to be used for abutment. (A) The cuspid will be inadequate if prepared normally in relation to existing gingiva. (B) Gingivectomy and gingivoplasty. Note removal of the fibrotic mass distal to the cuspid. (C) The abutment is now three millimeters longer. This addition represents the difference between an indifferent result and a completely satisfactory prosthesis. The anterior border of the denture rests on the area formerly occupied by the fibrotic mass.



7.

Salvaging strategic root. (A) The root is destroyed by caries so far under the gingiva as to impinge on the underlying bone. The remaining root, however, is long enough for a competent abutment. (B) Osteotomy and gingivectomy. Enough alveolar bone and gingival tissue was removed to expose sufficient root for the margins of the subsequent restoration. (C) Completed crown. Salvaging this root could only be accomplished by perioprosthodontics.

Contributing Factors in Successful Treatment — There are two factors which make these extensive designs possible:

(1) This type of treatment should be undertaken only on teeth that exhibit pulpal recession. This is true of the patient in need of such treatment who is middle-aged or older. Recession has been further encouraged by the pulpal irritation of the long-standing caries and old restorations.

Extensive perioprosthodontia is contraindicated in young adults and should be postponed as long as possible; a compromise in approach should be substituted. The hazards in young people are probable pulp involvement and teeth too sensitive to thermal changes to be comfortable.

(2) The advent of the ultra-speed cutting instruments makes the necessary extensive preparations possible. The small stones can easily follow the convolutions and intricacies of the roots, while the speed of the new contra-angles makes it possible to prepare many teeth at one sitting. In addition to the altered concepts of abutment preparation in perioprosthodontia, the restorations which result must also have modern function and appearance. The requirements are the following:

1. They must not only restore the anatomic crowns and parts of the roots, but also the interproximal spaces.

2. The artificial crowns and roots must be built to coincide with the new position of the gingival line which is more apically placed after treatment.

3. The interproximal spaces also need new reconstruction since they too are exaggerated after treatment.

4. The new contacts should be areas rather than points, and take the place of the excised and receded papillae. To build the interproximal spaces as they were would result in poor esthetics, lack of comfort (since food would be packed into these enclosed spaces) and poor function.

5. Exaggerated interproximal spaces would induce future caries and periodontal breakdown and disease.

Treatment in Severe Cases — Because the prognosis of many teeth is doubtful, the following measures are adopted:

1. The finished restorations are cemented temporarily. Every six months the splints or bridges are removed by tapping them off the teeth.

2. The roots are scaled, the gingivae curetted if necessary, and the bridges are cleaned and polished.

3. Shiny spots on the gold are relieved and the restorations are again installed with temporary cement.

Advantages

1. This technique ensures ease in making future adjustments, mechanical as well as biologic, when they become necessary. Biologic repairs include (1) the eradication of caries, (2) endodontics, and (3) possible extractions.

2. After sufficient time has elapsed and the prognosis appears to be good, the bridges can be permanently cemented. Temporary cementation necessitates strong margins on all restorations, none thin or feather edged.

3. Dies are kept and margins checked each time bridges are removed. This operation is time consuming but offers many obvious advantages, notably improved patient psychology.

4. There is satisfaction in knowing that complicated and expensive restorations can be kept in condition without having to be destroyed and made over.

Geriodontics has become an important consideration in dentistry and the challenge to maintain the masticatory organ in function becomes greater. Patients are aware that dental science can help them keep their teeth throughout life, and hence insist that the dentist employ all available techniques. The science of perioprosthodontia is a partial answer to the patient's demand.

Summary

1. Patients in need of reconstructive dentistry are usually in need of periodontal treatment as well.

2. A rationale and technique has been presented for combining periodontal procedures with operative and prosthetic procedures.

3. The advantages noted are:

a. Better accessibility and visibility.

b. Fewer visits are required to complete treatment with greater efficiency.

c. The same anesthesia can be used for operative and periodontal procedures.

d. Diagnosis and treatment-planning can be done efficiently.

4. The disadvantages are few:

a. The procedure is contraindicated in young adults because the possibility of pulp involvement exists and because of possible thermal sensitivity.

15 *East 58th Street, New York* (L.H.R.)

995 *North Miami Beach Boulevard, North Miami Beach* (M.R.)

An Invitation to Contributors:

Since 1894 when DENTAL DIGEST was founded the pages of this journal have been open to articles contributed by dentists throughout the world, The emphasis has been, and will continue to be, on the publication of articles on all phases of clinical practice.

DENTAL DIGEST encourages the use of many illustrations to show techniques. We prefer that the text be short and that step-by-step technical procedures be presented as an illustrated "clinic on paper."

A booklet, *Suggestions to Authors*, has been prepared by the editorial staff and will be sent free on request.

Why publish? Any dentist who has developed a technique, refined a procedure, or has made a significant clinical observation has the opportunity to record these advancements and elevate his professional standing by making a contribution to the literature.

* * *

For all illustrated articles that appear in DENTAL DIGEST the author will receive an honorarium of $50 to help defray his expense in preparing the photography or drawings.

Contributors are invited to send their articles to:

Edward J. Ryan, D.D.S.
Editor, DENTAL DIGEST
708 Church Street
Evanston, Illinois

A Simple Method of CARDIAC RESUSCITATION

W. B. KOUWENHOVEN, DR. ING.,* JAMES R. JUDE, M.D.,**
and G. GUY KNICKERBOCKER, M.S.E.,*** Baltimore

DIGEST

Cardiac arrest results from a variety of causes, including anesthesia, anoxia, and myocardial infarction, and may occur when a patient is undergoing dental treatment. In circulatory arrest the heart may be either in asystole or ventricular fibrillation. When this emergency occurs prompt action is essential as the human brain can only survive three or four minutes without oxygenated blood. When the pulse disappears and the respiration ceases two measures must be effected: (1) artificial respiration, and (2) the circulation of the oxygenated blood. This article describes the procedure used to obtain cardiac resuscitation when an emergency arrest of heart activity occurs.

First Steps in Treatment

1. In treating cardiac arrest the patient must first be placed in a supine position, preferably on a firm support such as the floor or a table. If placed on a bed, a board should be placed under the patient's back.

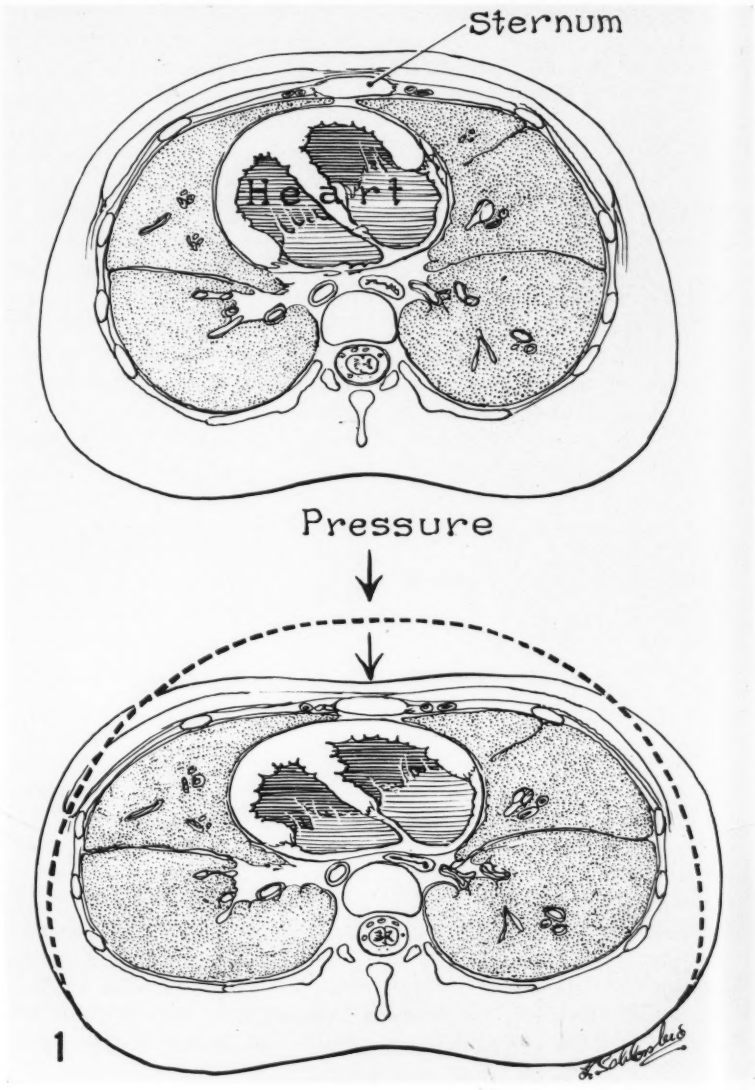
2. The chin should be raised, the neck extended as is done in the practice of mouth-to-mouth respiration.

3. The blood is circulated by applying closed chest heart massage. Heart massage and artificial respiration should be applied simultaneously. When these measures are in process an ambulance should be called.

Heart Massage—Definition

Closed chest heart massage[1] is a method of squeezing the heart by pressing on the breast bone. This provides adequate circulation to nourish the central nervous system and maintain the tone of the heart without resorting to thoracotomy.

Method—The manner in which the heart is squeezed by pressing on the breast bone is shown in Figure 1 which



1.
Cross section of chest.

is a cross section of the chest at the level of the lower third of the sternum. The heart lies between the sternum and the vertebral column and its lateral movement is restricted by the pericardium. The ribs are joined to the sternum by their costal-cartilages. The chest of a conscious person is rigid, but that of an unconscious person is remarkably flexible.

Blood Forced into Circulatory System—When the breast bone is depressed by the application of pressure, the heart is squeezed between it and the vertebral column and blood is forced out into the circulatory system. When the pressure is released the chest expands and the heart refills. The operation of the heart assures the circulation of blood when rhythmic pressures are applied to the sternum.

Steps in Procedure

1. Provide a patent airway.

2. Closed chest cardiac massage is applied by placing the two hands, one above the other, on the breast bone of the patient as illustrated in Figure 2. The cardinal points for the location of the hands are the xiphoid, at the lower end of the sternum, and the suprasternal notch at the upper end. The breast bone lies between these two landmarks.

3. The heel of the lower hand is placed on the lower third of the sternum, just above the xiphoid, and the other hand is placed on top of it. Firm vertical pressure should be exerted at the rate of 60 to 80 times per minute. No pressure is exerted with the fingers.

4. When pressure is released the hands may be lifted a fraction of an inch from the chest. Systolic blood pressures of 90 to 120 millimeters of mercury, and diastolic pressures of 30 to 50 millimeters are normally realized.

5. The operator may approach the patient from either side, whichever is more convenient. It is less tiring and the best results are obtained if the operator is higher than the patient, so that he may hold his arms rigid and use some of his body weight in applying the pressure. If the patient is a child one hand is sufficient.

6. An airway has been inserted into the mouth of the patient shown in Figure 2 to assure the passage of air into and out of the lungs by mouth-to-mouth artificial respiration.

Airway Must be Present—If there is only one operator available in the emergency, he should first be sure that there is a patent airway, and then inflate the patient's lungs with three or four quick deep breaths mouth to mouth. Then apply heart massage for about a minute before ventilating the lungs again. Continue until aid arrives to take over artificial respiration.

Signs of Resuscitation—The patient's condition may be observed during the application of massage and artificial respiration. The pupils should remain constricted. If they were di-

2.
Closed chest heart massage.

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*Lecturer in Surgery, Johns Hopkins University School of Medicine.
**Resident Surgeon, Johns Hopkins University School of Medicine.
***Assistant in Surgery, Johns Hopkins University School of Medicine.

Author's Note: This study was supported by a grant from the National Heart Institute, National Institutes of Health.

[1]Kouwenhoven, W. B.; Jude, J. R.; Knickerbocker, G. G.: Closed Chest Cardiac Massage, JAMA **173**:1064 (July 9) 1960.
[2]Kouwenhoven, W. B.; Milnor, W. R.; Knickerbocker, G. G.; and Chesnut, W. R.: Closed Chest Defibrillation of Heart, Surgery **42**:550 (Sept.) 1957.
[3]Kouwenhoven, W. B.; Knickerbocker, G. G.; Milnor, W. R.; Jude, J. R.: Field Treatment in Electric Shock Cases 11, Elect. Eng. **79**:500 (June) 1960.

lated before the start of resuscitation, they should constrict afterward. In some cases a patient may make attempts to breathe on his own. These signs indicate that the resuscitative techniques are effective. With effective heart massage a palpable pulse may be detected, especially in a femoral artery.

Effective Aid in Hypotension—In some instances of cardiac standstill this massage plus artificial respiration may be sufficient to cause the heart to resume autogenous beats. In other instances, including cases of ventricular fibrillation, the heart will not resume sinus rhythm and if massage is stopped spontaneous breathing ceases and the pupils dilate rapidly. Closed chest cardiac massage may also be used as an effective aid in cases of marked hypotension. It is not necessary to attempt to synchronize the massage with spontaneous cardiac activity.

Procedure Should be Continued Without Interruption—Both heart massage and artificial respiration should be continued in the ambulance on the way to the hospital. The hospital should be notified so that immediately upon arrival an electro-cardiogram may be taken and the nature of the arrest determined. If the heart is in fibrillation, it should be defibrillated with a closed chest defibrillator.[2,3] Supportive drugs should be administered as needed.

Efficacy of Technique Demonstrated—At Johns Hopkins Hospital where this report was compiled, in more than 50 cases of cardiac arrest, three out of four patients who received closed chest cardiac massage recovered to their former central nervous system status. The patients observed ranged in age from one month to 82 years.

Summary

When there is sudden loss of respiration and heartbeat, immediate action is necessary. If a few breaths in mouth-to-mouth artificial respiration are not sufficient to induce spontaneous respiratory and cardiac activity, there is no need to wait for further diagnostic attempts. Closed chest cardiac massage and artificial respiration should be applied at once. Because of the simplicity of this method anyone can now apply heart massage.

Johns Hopkins University
School of Medicine

Epinephrine

Problem

What is the general effect of a subcutaneous injection of 1 cubic centimeter of a 1:1,000 solution of ephinephrine? Does this procedure produce a significant peripheral vasodilatation? Does the epinephrine as usually provided contain any significant amounts of levarterenol bitartrate? What effect does epinephrine have on cardiac output?

Discussion

The usual effects of the subcutaneous injection of 1 cubic centimeter of a 1:1,000 solution of ephinephrine include (1) an increase in cardiac rate and output; (2) a smaller increase, or no change, in the stroke volume; (3) a small increase in the systolic blood pressure; (4) a fall (or no change) in the diastolic pressure; (5) a marked fall in the total peripheral circulatory resistance; (6) an increase in the respiratory rate; and (7) a small increase in the metabolic rate.

Constriction and Dilatation—The arterioles of the skin, mucous membranes, and the splanchnic areas ordinarily respond to a dose of epinephrine of this magnitude by constriction whereas those of the skeletal muscle are dilated, but vasodilation seems to predominate over vasoconstriction, so that a net decrease in total peripheral resistance results. Coronary blood flow is enhanced, both as a result of vasodilation and of increased cardiac activity. Cerebral blood flow is increased only when a rise in blood pressure occurs.

Ventricular Contraction Increased—Epinephrine stimulates the myocardium directly, thereby producing more forceful ventricular contraction. Stroke volume and cardiac output are therefore ordinarily increased. Theoretically, however, if cardiac acceleration becomes too marked, insufficient ventricular filling time may lead to a decrease in cardiac output rather than the usual increase.

Levarterenol Limited—Commercial epinephrine obtained by extraction from the adrenal medulla formerly contained up to 18 per cent of levarterenol, but U.S.P. XVI (effective October, 1960) limits the permissible amount of levarterenol to not more than 4 per cent by weight.

Adapted from Questions and Answers, *Journal of the American Medical Association* **174**:443 (Sept. 24) 1960.

The INCISAL RELATIONSHIP

in the Human Dentition—Part One

CAPTAIN HENRY A. COLLETT (DC) U.S.N. Ret., Miami, Florida

DIGEST

The incisal relationship presents one of the more important problems in the scheme of the human occlusion. A number of questions present themselves: (1) What is the relationship presented by the incisors of the patient? (2) What is the etiology of this relationship? (3) What is its significance? (4) Can anything be done to correct the condition? If so, what methods should be applied and under what circumstances?

This article supplies the answers to some of these problems. In this part, which is the first of two, a discussion of statistical analyses and etiology is presented.

Statistical Analysis

In a study of 512 patients[1] variations in the natural occlusion were recorded. One of the characteristics that received particular attention was the overbite and the overjet and their limiting effect on the horizontal movement of the mandible while the teeth were in occlusion.

Variation Noted—(1) In the patients examined the vertical bite relationship of the incisors varied from a 5-millimeter open bite to a 10-millimeter overbite; the average overbite was 2.49 millimeters.

(2) The horizontal relationship varied from a 3-millimeter prognathism to a 10-millimeter overjet. The average overjet was 1.97 millimeters.

(3) Twenty-five patients had an edge-to-edge bite in the anterior teeth; 11 presented a prognathism; 9 had cross bites of the anterior teeth; and 9 had open bite malocclusions.

Patients Classified—For the purpose of this study the patients were divided in three groups: 1. Those whose incisal relationship would not materially interfere with the horizontal excursions of the mandible while the teeth were in occlusion, because the occlusion approached a condition of balance as it is understood in complete denture construction.

2. Those who were limited in the protrusive excursion by their overbite, but because of a compensating overjet had a fairly free lateral excursion.

3. Those who were limited to centric position because the horizontal movements of the mandible were prevented when the teeth were in occlusion. This was due to a deep overbite with little overjet in the dentition.

Balanced Relationship: The first group (where the incisors presented a *balanced* relationship) numbered 54 per cent. That is, these patients were close to freedom in both protrusive and lateral excursions. The cuspal inclines of the posterior teeth were in harmony with the overbite and overjet. This permitted the mandibular anterior teeth to pass the maxillary teeth without interference when the mandible was moved through the various excursions.

Average Overjet: The overbites of these *balanced* cases varied from 0. to

Author's Note: The opinions or assertions contained in this article are those of the author and are not to be construed as official or reflecting the views of the Navy Department or the naval service in general.

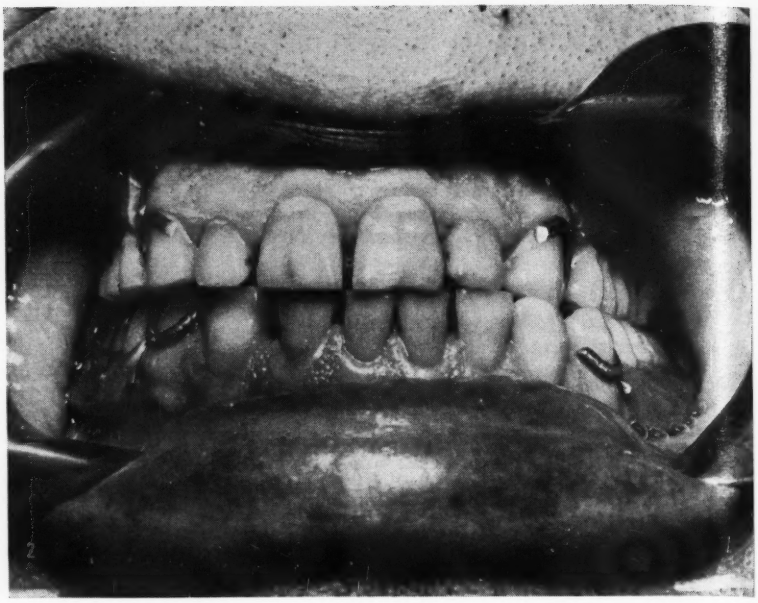
[1]Collett, Henry A.: Variations in the Natural Occlusion and Their Significance in the Construction of Prosthetic Restorations, JADA **40**: 59 (Jan.) 1950.

1.
Forty-six per cent of 512 patients had an incisal relationship that would interfere with the free horizontal movements of the mandible with the teeth in occlusion. Twenty-six per cent were locked in centric occlusion by a deep overbite with little overjet similar to the condition shown.

5.0 millimeters, the average being 1.27. The horizontal relationship varied from a 2.0-millimeter prognathism to a 5.0-millimeter overjet. The average overjet was 1.54 millimeters.

Protrusive Movements Limited: Nineteen per cent of the patients examined had free lateral excursion of the mandible but were limited in protrusive by excessive overbites. These patients presented overbites from 1 to 10 millimeters, the average was 3 millimeters.

Steep Overbite and Little Overjet: The mandible was limited to centric occlusion in 26 per cent of those examined because of a relatively steep overbite and relatively little overjet (Fig. 1). The overbites of these patients were from 2 to 10 millimeters. The average overbite was 4 millimeters. The overjets of these locked bites were from 1 to 5 millimeters. The average overjet was 1.5 millimeters.



2.
A favorable incisal relationship permits the construction of replacements with a balanced occlusion, making it possible to distribute occlusal forces resulting from horizontal movements of the mandible. Fifty-four per cent of 512 patients examined presented incisal relationships that would lend themselves to a balanced occlusion. This illustration shows the mandible in the left lateral excursion with a balanced articulation of two partial dentures together with the patient's natural anterior teeth.

Conclusions from Observations

From this survey it would appear that it is possible to come close to duplicating, in complete dentures, the occlusion of 54 per cent of the patients seen; that is, if it is hoped to accomplish a condition approaching a balanced occlusal scheme (Fig. 2). Preextraction records such as photographs, casts of the natural teeth, acrylic face masks, contoured wire profiles, and profile roentgenograms would be invaluable for the purpose of duplicating the conditions, especially if immediate dentures had not been constructed.

Modifications Possible—The survey also suggests that in 46 per cent of the patients (the second and third groups) modifications of the incisal relationship might be considered under certain conditions for the purpose of *balancing* the occlusion to eliminate or reduce damaging horizontal forces. Here pre-extraction records would be of value for the purpose of determining what changes are possible and how they could be accomplished.

Relationship Evaluated—Since the deep overbite is likely to cause unfavorable symptoms at some time in the patient's history and since such a large percentage of patients (46 per cent) seem to have this relationship, it may be of value to examine the etiology.

Occlusal Vertical Dimension may be Less than Average—A deep overbite with little overjet may be found in normal jaw relationships (Angle Class I) as well as in orthognathous relationships (Angle Class II, Division 2 malocclusions). To evaluate these relationships they must be associated with both the rest position and occlusal vertical dimension. Many of these patients have less than average occlusal vertical dimension.

Endogenous Etiology of Deep Overbite

Brodie[2] states that the morphologic pattern of the craniofacial complex is constant. In 1942 Brodie and Thompson[3] demonstrated that the relationship of the mandible to the rest of the craniofacial complex is established long before the eruption of the teeth. If these theories are true, the spatial position of the mandible can be predicted. Thus, the location of the chin and subsequently, the amount of freeway space can be foreseen.

Theory Limited—This theory is helpful, but it appears to have some limitations. The spatial position of the mandible perhaps can be predicted in certain stages of development in the younger patients and it is likely that the rest vertical dimension remains fairly constant for a number of years, but it is not likely that the vertical dimension remains constant throughout a normal life span.

Dimension may Decrease—The vertical dimension depends on the tonicity of various groups of muscles, namely, a balance between the muscles of the back and neck with the muscles of mastication and the hyoid muscles. As the patient advances in age and his posture becomes somewhat stooped it is probable that the vertical dimension decreases, perhaps con-

[2]Brodie, A. G.: On the Growth Pattern of the Human Head from the Third Month to the Eighth Year of Life, Am. J. Anat. **68**:209 (March) 1941.

[3]Brodie, A. G., and Thompson, J. R.: Factors in the Position of the Mandible, JADA **29**:925 (June) 1942.

tributing to occlusal trauma of the incisors.

Balance may be Modified—While this muscle balance is predetermined as a result of genetic background, environmental conditions which affect the patient's posture (such as his occupation) seem to have a modifying influence on this balance.

Origin may Vary—One of the endogenous causes is heredity. The vertical occlusal position of the molars and bicuspids depends on the balance of the muscles affecting the mandible mentioned above. This is predetermined by genetic background.

Sequence of Eruption may be a Factor—A relatively deep overbite in relation to the overjet, may result from the sequence of eruption of the teeth, causing a limitation of horizontal mandibular excursions, with excessive horizontal force on the anterior teeth.

Favorable Sequence: In the mandible the eruption sequence favored is cuspid, first bicuspid, second bicuspid, finally second molar; although the theory is somewhat controversial it is possible that the lower permanent cuspids must erupt first to maintain normal arch length. At any rate if they do erupt first they will prevent lingual collapse of the anterior segment.

Mandibular Anterior Collapse: Anterior collapse in the mandibular arch is often associated with a deep overbite because it results in insufficient lingual support for the maxillary anterior. Consequently the force of the lip muscles will cause lingual and incisal movement.

Eruption of First Bicuspid: If the first bicuspid erupts first, the cuspid will experience difficulty in erupting, particularly if the deciduous cuspid is lost prematurely. This is likely to result in some lingual collapse of the anterior segment together with mesial tipping of the first bicuspid.

Exogenous Etiology of Deep Overbite

Some contemporary orthodontists extract bicuspids to provide room for the regular arrangement of the anterior teeth. This practice is likely to result in a greater overbite with a lesser overjet tending to limit the horizontal excursions. Extraction of the mandibular bicuspids can result in the loss of arch support for the anterior teeth. Consequently the muscles of the lip exerting a lingual force will tend to move them lingually until the space is closed.

Equilibrium may be Disturbed—As the lingual support of the maxillary incisors from the incisal edges of the mandibular incisors is removed the equilibrium between the lip muscle pressure and the arch support will be disturbed. The maxillary teeth will then move backward and downward, increasing the overbite and decreasing the overjet. This in turn will inhibit the horizontal movement of the mandible. Early loss of a bicuspid without replacement will give the same result.

Exogenous Factors Applied by Patient—Lip sucking, tongue sucking, pillowing, and habits which exert pressure on the anterior teeth may possibly be applied by the patient. An excessive amount of stress in this area may move the maxillary teeth incisally and lingually causing a deep overbite with little overjet.

Syndrome may Terminate in Deep Overbite—Loss of teeth in the posterior region may set up a syndrome which will terminate in a deep overbite with little overjet.[4] For instance, if the first permanent molar is lost and not replaced, the bicuspids proximating the edentulous space shift distally. This movement is succeeded by a shifting and subsequent flattening of the dental arch in the anterior region toward the side from which the posterior tooth is missing. If loss in the mandible causes a shifting of the mandibular anterior teeth it may leave the maxillary anterior teeth unsupported.

Results of Continuous Eruption—The maxillary anterior teeth are then subjected to the phenomena of continuous eruption and the muscular forces of the obicularis oris muscle. These forces will cause them to move incisally and lingually, resulting in a deep overbite with little overjet.

Force Transmitted—The loss of mandibular anterior teeth may result in a similar syndrome. The obicularis oris muscle acts on the maxillary segment which in turn transmits the force to the mandibular anteriors. This may reduce the arch of the mandibular anterior teeth resulting in a smaller radius.

Excessive Overbite with Little Overjet—The pressure of the lower lip on the maxillary incisors moves them incisally and lingually. The result of this movement is an excessive overbite with little overjet.

Possible Effects of Growth Process—In other cases the metabolic process affecting development may result in a lack of vertical growth in the posterior region. This coupled with exogenous factors could produce a deep overbite.

Some Limitation of Mandibular Horizontal Movements—In another type of malocclusion with an orthognathous relationship (Angle Class II, Division I) an excessive overbite is associated with appreciable overjet. While this relationship limits the horizontal movement of the mandible the limitation is not nearly as marked as it is with a more limited overjet. The survey here reported showed this type to be about 19 per cent. The etiology of this type of malocclusion may be endogenous or exogenous and includes (1) hereditary potentials, (2) childhood thumbsucking, (3) lip-biting, (4) tongue-biting, (5) nail-biting, and (6) abnormal upper respiratory function of the type that causes an imbalance in the pneumatic pressure of the nasal and oral cavities interfering with normal development. Mouth-breathing is an example of this malfunction.

Conflicting Theories of Etiology[5,6,7]

There is disagreement concerning some of the etiologic factors resulting in this type of deep overbite:

1. It has been claimed that the height of the mandibular ramus is an influencing factor in the establishment of an occlusal vertical dimension and that if the ramus does not grow sufficiently in a vertical direction the inter-

[4]Salzman, J. A.: Effect on Occlusion of Uncontrolled Extraction of First Permanent Molars: Prevention and Treatment, JADA **30**:1681 (Nov.) 1943.

[5]Diamond, Moses: The Ramus as a Factor in the Development of the Dental Height (Abs.), J. Dent. Res. **22**:346 (Aug.) 1943.

[6]Wylie, W. L.: The Relationship Between Ramus Height and Dental Height and Overbite, Am. J. Orthodontics **32**:57 (Feb.) 1946.

[7]Dunn, Robert: Vertical Overbite and Arrested Vertical Development in the Molar and Premolar Region, Internat. J. Orthodont. & Oral Surg. **12**:686 (Aug.) 1926.

maxillary space will not increase. This inhibits the continuous active eruption of deciduous posterior teeth but does not interfere with the continuous eruption of the anterior teeth. The result is insufficient occlusal vertical opening with a deep overbite.

2. Another opinion is that cephalometric study does not substantiate this theory although these studies seem to indicate that growth of the mandibular ramus is of great importance to harmonious facial lines.

3. In malocclusion associated with orthognathous jaw relationship (Angle Class II, Division 2) the overbite is usually associated with an infra-occlusion of the posterior teeth. This might be described as arrested vertical development of the bicuspids and molars. As a result the soft tissue lingual to the maxillary incisors acts as an inclined plane. This often results in a lingual tipping of the mandibular incisors, which in turn may arrest the anterior development of the arch or force the mandible distally.

4. The lower lip normally rests against the labial surface of the mandibular incisors and the incisal third of the labial surface of the maxillary incisors. In the condition described above the muscular forces of the lower lip are exerted only on the labial surfaces of the maxillary incisors causing them to move lingually and incisally, resulting in a limitation of the horizontal movement of the mandible.

Physiologic and Pathologic Effects of a Deep Overbite

The effects of a deep overbite on the dynamic aspects of occlusion may be considered. It has been shown by investigation that the cusp height of the posterior teeth have an effect on the chewing cycle.[8,9] The investigations indicate that steep cuspal inclines cause a more vertical chewing cycle.

Control of Chewing Cycle — Although there is still much to be learned about the functional movements of the mandible, it would seem that the chewing cycle is controlled by proprioceptive and exteroceptive reflexes stimulated by the height of the cusps.

Possible Stimulation by Overbite— Could not these reflexes be stimulated even to a greater degree by a steep overbite, conditioning these reflexes and resulting in a greater influence on the chewing cycle than the height of the cusps? In these cases the maxillary and mandibular anterior teeth will contact each other before the posterior teeth in excentric positions stimulating the reflexes and resulting in a more vertical chewing cycle. This may be nature's attempt to reduce damaging horizontal forces on the anterior teeth.

Nonfunctional Movements—Created in part by nonspecific psychogenic stresses of modern living, nonfunctional movements can be extremely damaging to the supporting structures of both natural and artificial dentures because these forces are usually perpendicular to the long axis of the teeth, the direction in which the teeth are less able to tolerate trauma. When this stress is concentrated on a few teeth, as it is with a steep overbite, especially with a limited overjet, the damage is likely to be magnified proportionately.

Toleration Reduced — Young patients can tolerate this excessive horizontal force; but as they advance in age and reparative mechanisms do not function as well as they once did, there is likely to be periodontal breakdown.

Aid to Distribution of Forces — Slight overbite, compensated by adequate overjet, makes it easier to distribute the forces of occlusion over the entire dental arch rather than to concentrate on a few teeth; consequently, the natural or replacement denture is in a better position to tolerate the overbite. The problem of stress distribution is considerably greater with a deep overbite and in many instances can be accomplished only by modification of this relationship.

Summary and Conclusion

A study of 512 patients showed that in 46 per cent an incisal relationship is present that will interfere with the horizontal movements of the mandible while the teeth are in occlusion.

This deep overbite may have an endogenous or exogenous etiology. The endogenous may be genetic or metabolic associated with irregular eruption of the teeth. The exogenous etiology may be from premature extraction or extraction as part of orthodontic treatment. Habits of the patient may also be one of the exogenous causes of deep overbite. Abnormal upper respiratory function of the type that causes an imbalance of pneumatic pressure of the nasal and oral cavities may interfere with normal development with the same result.

Conflicting theories exist concerning the development of deep overbite, especially in the fields of growth and development. Both physiologic and pathologic results are possible from this overbite relationship.

(End of Part One)

555 *South West First Street*

[8]Payne, S. H.: Comparative Study of Posterior Occlusion, J. Pros. Dent. **2**:661 (Sept.) 1952.
[9]Jankelson, Bernard; Hoffman, George M.; and Henderson, J. A., Jr.: Physiology of the Stomatognathic System, JADA **46**:375 (April) 1953.

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The DISPLACEMENT *of* TISSUE

in Elastic Impression Procedure

JOSEPH RUBINSTEIN, D.D.S., Highland Park, Illinois

DIGEST

One of the problems in an elastic impression procedure is the displacement of the tissue surrounding the cavity preparation. This article illustrates a technique which combines freshly mixed rubber base material with material that has polymerized.

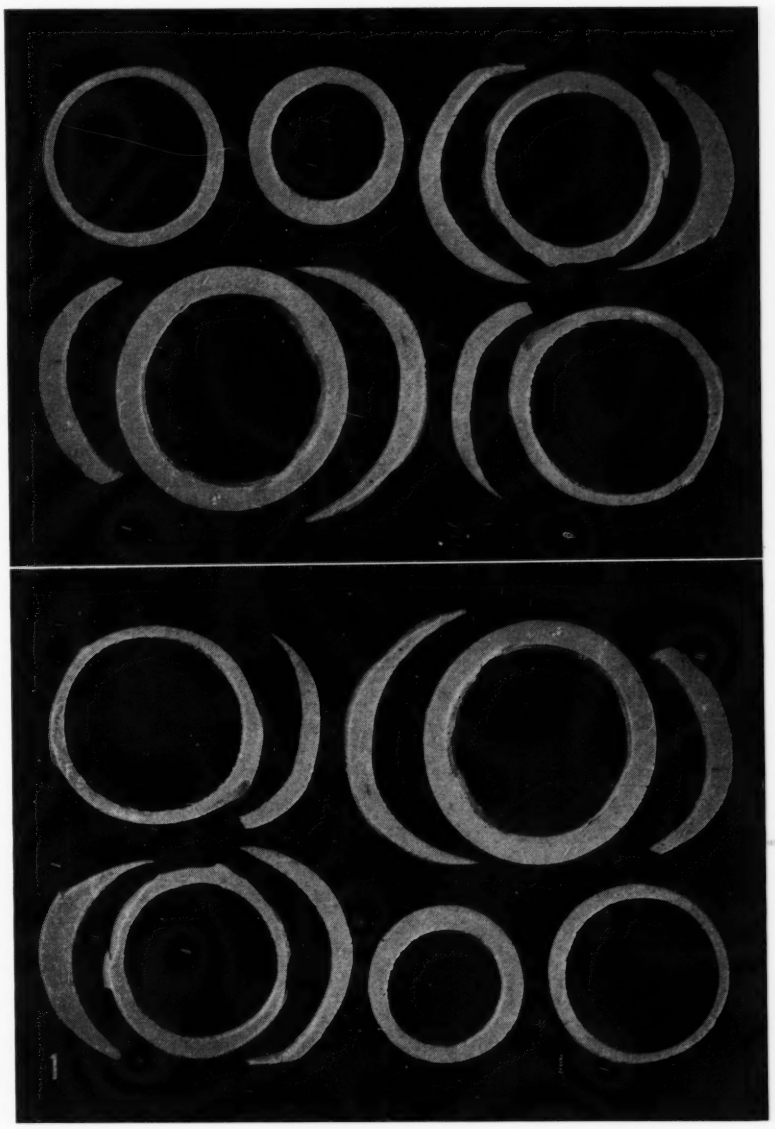
Methods Employed

Formerly it was believed by some operators that the use of a fairly stiff impression material would force the gingivae in the apical direction and thus fully expose the gingival portion of the tooth preparation. Others advocated the use of vasoconstrictors or astringents to produce a similar effect. Recently, a procedure has been evolved which makes use of a copper band as a mechanical separator.

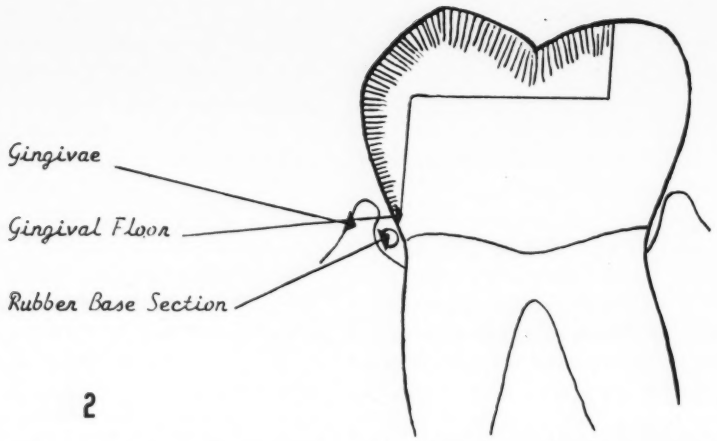
Requirements Increased—The introduction of the polysulfide and silicone impression materials has increased the requisites for a successful impression technique:

(1) Not only must the tissue be displaced from the cavity preparation, but seepage from the tissue or moisture in the tooth preparation must also be avoided.

(2) The rubber base materials are water repellent; a moist cavity would



1.
Sections prepared from polymerized rubber base material, magnified three times.



2.
The position of the half-moon shaped rubber material at the gingival floor of a lower molar is shown.

not permit an accurate impression.

Combination of Materials Effected —The basic principle of the technique presented here is the fact that freshly mixed rubber base material can combine with material which has already polymerized. A small, wedge-shaped section is prepared from a rubber base material which has completely set and shows satisfactory elastic properties.

Steps in Procedure

1. In the case of a two-surface preparation the section from the rubber base material should have the shape of a half moon duplicating in its contour the gingival circumference of the tooth in treatment (Fig. 1).

2. The material is placed between the free gingivae and the area of the tooth included in the cavity preparation. It should not extend over the gingival floor of the cavity (Fig. 2).

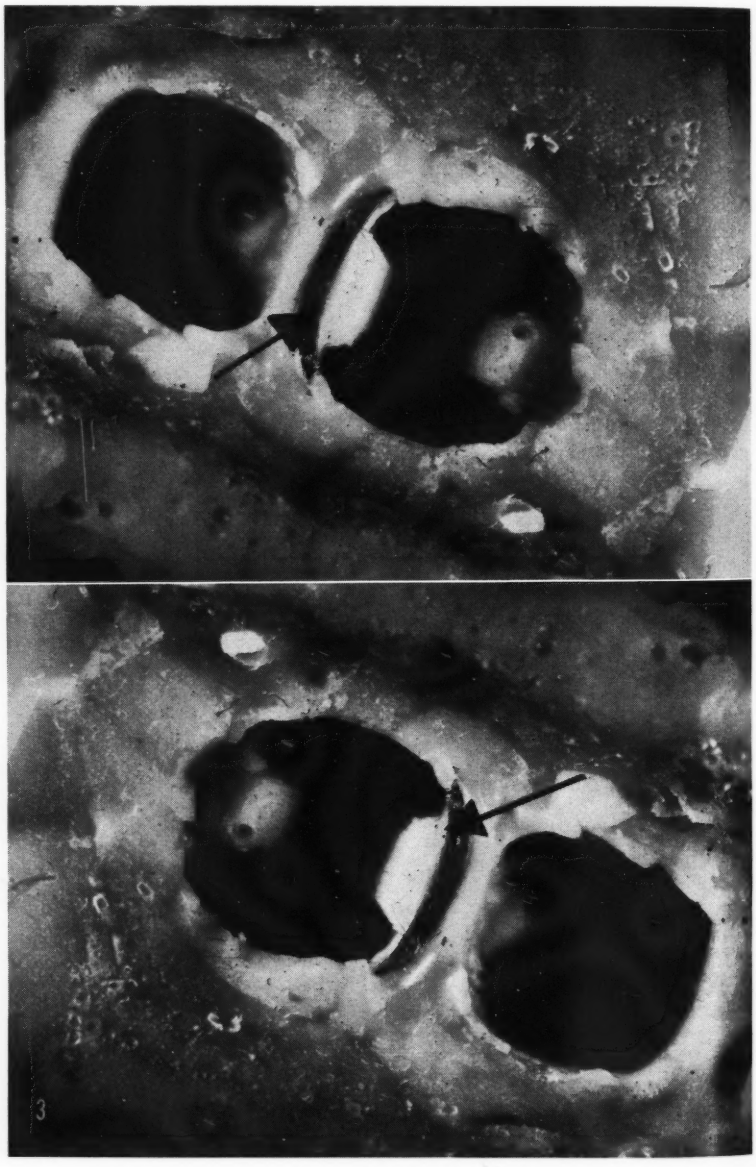
3. Applied in the manner described, the material will displace the tissue sufficiently to allow full exposure of the cavity preparation. Seepage from the gingivae is also prevented and the moisture in the cavity is reduced.

4. The impression procedure is completed with a syringe and a tray according to directions. Upon removal of the impression it will be noted that the section originally inserted into the gingival crevice has become incorporated into the impression (Fig. 3).

5. If the preparation extends over three surfaces or if it is a crown preparation, the elastic material should have the shape of a ring.

6. It is necessary to select a ring which fits the tooth loosely. Otherwise, the ring will tend to constrict the gingival margins of the impression after its removal from the mouth and thus seriously deform the final impression.

1893 *Sheridan Road*



3.
The arrows indicate section of rubber base material incorporated in the impression. The material is magnified six times.

The UNERUPTED PALATAL CUSPID

ROBERT A. ATTERBURY,* B.S., D.D.S., Oak Park, Illinois,
and SUNDER J. VAZIRANI,** D.D.S., M.S., Patiola, Punjab, India

DIGEST

The unerupted palatal cuspid requires a particular approach irrespective of the orthodontic or oral surgical viewpoint. These cuspids are often referred to as impacted but in most cases unerupted would probably be a better term, even though the treatment is usually similar.

The Approach to Treatment

In considering the question of correction in the case of a child's missing upper cuspid several questions must first be answered:

1. What *caused* the noneruption?
2. What is the *position* of the unerupted cuspid?
3. What is the *treatment* of choice?

Possible Causes of Noneruption

The cause of noneruption which in many cases is obscure may be due to the following conditions:

(1) Supernumerary teeth, although this is a rarity in the cuspid area.

(2) The original position of the tooth germ, which is above that of the first bicuspid.

(3) Dense bone and fibrous tissue in the eruption path.

(4) History of trauma or injury over the area.

(5) Over-retention of the deciduous cuspids, which often block or deflect the permanent cuspid.

(6) A hereditary factor.

The arch development is good in many cases in which the cuspids are unerupted and there is usually adequate space for the tooth. Thus, many patients are not seen before 12-14 years of age.

Classification of Displacements

The position of palatally displaced cuspids may be classified from an oral surgical point of view in the following groups:

Group 1—The cuspid, either labial or lingual, is almost vertical, with its apex possibly as far distal as the first bicuspid, and the crown may approximate the distal of the lateral incisor. The eruption prognosis is favorable (Figs. 1 and 2).

Group 2—The cuspid is lingually placed and the apex may be as far distal as the distal of the first bicuspid, while the crown may lie to the mesial of the lateral incisor. The prognosis is favorable for eruption except in cases where the two extremes exist and the space is almost closed (Figs. 3 and 4).

Group 3—The cuspid is more or less horizontal, so that the apex is in the second bicuspid area, while the incisal tip may be as far as the midline. The prognosis for orthodontic movement is impractical (Figs. 5 and 6).

These comments concerning positioning and prognosis apply primarily to palatally displaced cuspids, because those labially displaced rarely remain unerupted. When the latter occurs, these usually lie high in the labial sulcus and the prognosis must be determined individually.

Treatment Possibilities

Considering the patient's health and condition of the oral tissue, oral hygiene, general occlusion, and the patient's age, one of two decisions may be adopted:

1. Removal of the cuspid (the consequence of leaving such teeth *in situ* is known).

2. Expose the crown and permit orthodontic procedure to place the cuspid in its normal position.

Importance of Radiographs

Radiographs are necessary for a diagnosis and as an aid in arriving at a prognosis. There is no area in the mouth, however, in which an x-ray may be more misleading. This is true in routine radiography of the corners of the arch, and it is even more true when a cuspid is missing. Usually two x-rays are essential.

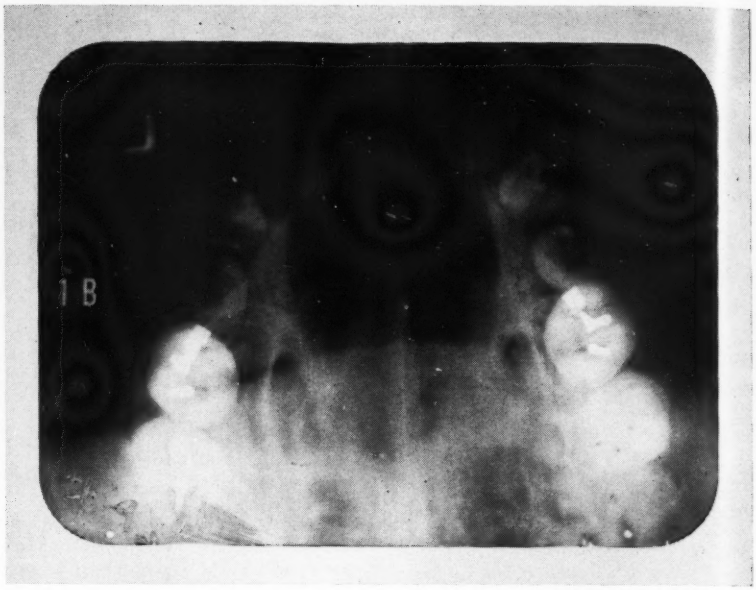
First X-Ray View—A periapical view of the precise area the cuspid should occupy is the objective of the first x-ray. This should be taken as if the cuspid were erupted in normal position, with the usual vertical and mesiodistal angulation. Care must be taken to avoid x-raying the *assumed* area of position of the unerupted cuspid because the information required is the relationship between its normal position and its actual position. A periapical film taken for normal position will reveal this information and will permit a correct diagnosis of the actual position of the cuspid.

Second X-Ray—This should be a true occlusal view angled so that the rays are directed parallel with the long axes of the incisors on the affected side, thus making them appear on the film as cross-sections. A film taken in this manner will reveal the relationship of the cuspid crown to the incisor roots.

Author's Note: Gratitude is expressed to E. Prorok, D.D.S. for assistance and orthodontic suggestions.

*Clinical Assistant Professor of Oral and Maxillofacial Surgery, University of Illinois, College of Dentistry and Research and Educational Hospitals.

**Head and Professor of Oral Surgery, Government Medical College, Patiola, Punjab, India.



1A, 1B, and 2.
The cuspid, either labial or lingual, is almost vertical. Its apex may be as far distal as the first bicuspid, and the crown may approximate the distal of the lateral incisor.

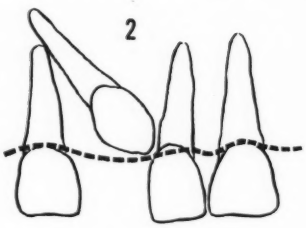
This is of major importance in surgical exposure of the crown. Additional x-rays may be of value where there is some doubt as to the anteroposterior position, using the "tube shift method."

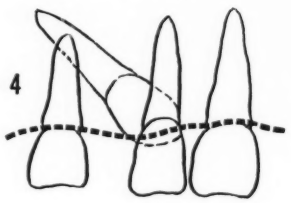
It must be emphasized that much time and effort will be saved if a thorough radiographic examination, with careful technique is done in every case.

Surgical Methods in General Use

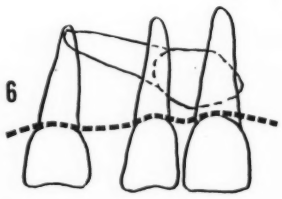
In the past three main surgical methods have been employed to aid eruption of the unerupted cuspid:

1. Simple excision of the overlying tissue (Fig. 7).





3 and 4.
The cuspid is lingually placed and the apex may be as far distal as the distal of the first bicuspid, while the crown may lie to the mesial of the lateral incisor.



5 and 6.
The cuspid is more or less horizontal, so that the apex is in the second bicuspid area, while the incisal tip may be as far as the midline.

2. Stimulation Method: This consists in (1) raising a mucoperiosteal flap, (2) removal of bone, (3) stimulation of the cuspid by slight instrumentation, and (4) replacing the flap. This is known as the stimulation technique (Fig. 8).

3. Visualization of Crown of Cuspid: This method includes: (1) raising of a mucoperiosteal flap, removal of the coronal sac, (3) channelling of the bone, (4) cutting a window in the flap, and (4) suturing to hold a pack

of cotton fibers impregnated with a mixture of zinc oxide and eugenol which prevents healing over the soft tissues. Thus, a cone-shaped opening is formed at the end of which the crown of the cuspid may be clearly visualized (Fig. 9).

Method of Choice

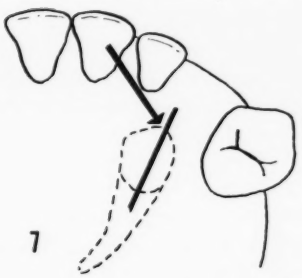
Disadvantages of First Two Methods—The first method described usually fails because it does not allow access to the crown to ensure an adequate exposure. Soft tissue excision achieves little and regenerates rapidly after excision.

The second method, the "stimulation technique" is more useful than the first method but often fails for the following reasons:

1. Unless the orthodontist is present at the operation, he never views the actual cuspid crown position.
2. Although any bone preventing eruption is removed, the soft tissue which is replaced still acts as a barrier and, in fact, the eruption may be impeded by formation of scar tissue.
3. When good results are obtained by this method, they develop slowly for the reason previously mentioned.
4. The application of any orthodontic attachment if such is required to aid eruption is not possible.

Third Method Preferred—The third method is therefore recommended and the actual technique will be described. It has none of the disadvantages of the first two methods but rather, it has the following positive advantages:

1. Full exposure of the crown of the unerupted cuspid is obtained and its exact position can be seen.
2. With this type of surgical exposure, the opening remains patent so that the orthodontist can accurately estimate the prognosis and plan treatment accordingly.
3. There is no formation of scar tissue over the cuspid to inhibit or delay eruption.
4. Eruption is quicker because tissue and bone obstruction is removed.
5. The orthodontist may, if necessary, attach appliances at his leisure.
6. The cotton-zinc oxide-eugenol pack in the opening affords a high degree of immediate postoperative comfort, such as that afforded in a gingivectomy.
7. The psychologic effect on the patient and the parents is good in that the cuspid tip can be felt with the tongue and even viewed by the parent, creating a feeling that positive results are forthcoming.



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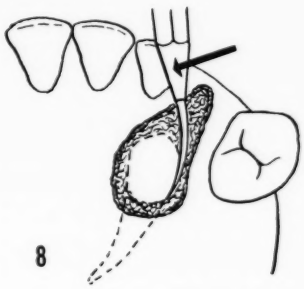

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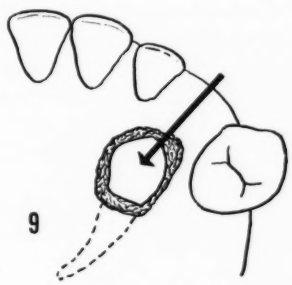


9

7.
Method (1): To aid eruption of the unerupted cuspid. Simple excision of the overlying tissue is done.

8.
Method (2): To aid eruption of the unerupted cuspid. Raising of a mucoperiosteal flap, removal of bone, stimulation of the tooth by slight instrumentation, and replacement of the flap. This is referred to as the "stimulation technique."

9.
Method (3): To aid eruption of the unerupted cuspid. Raising of a mucoperiosteal flap, removal of the coronal sac, channelling of the bone, cutting a window in the flap and, after resuturing, packing to prevent healing over of the soft tissues. Thus, a cone-shaped opening is formed at the end of which the crown of the cuspid may be clearly seen.

Surgical Technique

Steps in the surgical technique should be completed in the following order:

1. Design and elevation of the flap
2. Removal of palatal bone to create a channel to the crown
3. Preparing a window in the flap
4. Packing and suturing
5. Postoperative care

Elevation and Design of the Flap

The flap design is similar to that employed for the surgical removal of a palatal cuspid, but is more conservative. It is accomplished in the following manner:

1. A vertical incision is made distal to the first bicuspid and carried up into the palate about half way to the median line.
2. The gingival margin is freed to the center of the central incisor of the opposite side and the mucoperiosteum is undermined and reflected from the bone.
3. The flap is retracted using an Allis forcep or a suture being drawn to the opposite side of the mouth. The Allis instrument is applied to the body of the flap and not to the gingival margin. Injury to the gingival margin must be avoided.
4. This type of flap will usually provide adequate access and may be extended by increasing the vertical incision, avoiding overextension which may sever the greater palatine vessels.

Removal of Bone

Bur technique may be used for removal of the palatal bone to form a channel to the cuspid crown. Sharp bone chisels, however, preferably with hand pressure for psychologic reasons with a young patient or with very light mallet blows, may also be used to advantage. The following steps are taken:

1. When sufficient access is gained,

the sac should be curetted and removed to expose the crown and thus avoid accidental trauma to the crown.

2. The bone is removed until the surgical opening is slightly larger than the crown, particular care being taken in relation to the cervical tooth areas in the vicinity, namely, the lateral and central.

3. Any remaining coronal sac is removed with curets and eruption is stimulated by gently moving the tooth in all directions with a suitable instrument. It should now be possible to visualize the crown almost to the cementoenamel junction.

Preparing a Window

The flap is replaced and the approximate position of the window determined by stabbing it with a sharp scalpel directly over the crown.

When the flap is retracted, the window may then easily be cut with a curved scissors or scalpel. If such a window, to ensure adequate crown exposure, involves the gingival margin (usually between the central and lateral incisors) there need be no alarm. This gingival tissue margin would in any case be destroyed as the cuspid erupts and it will regenerate as the cuspid tends to move into its correct position.

Packing and Suturing—1. After the window has been prepared, the flap is firmly sutured into correct position.

2. A suture is then placed through two convenient sides of the window and the middle loop pulled up to allow insertion of the pack.

3. The pack consisting of cotton fibers, zinc-oxide and eugenol mixed to a putty-like consistency, is inserted with light pressures and the loop made fast and tied. This one suture (ooo black silk) will ensure the retention of the pack in most cases for 6 or 7 days.

4. The pack should be retained for 6 or 7 days to allow epithelialization of the tissue funnel to the cuspid crown. Early removal of the pack may invite mild to severe hemorrhage.

Postoperative Care—(1) The patient should be observed 24 hours after surgery to ensure that he is comfortable, the flap is in good condition, and the packing satisfactory.

(2) Routine postoperative directions are given to the patient and parents to avoid disturbance of the pack. A soft nutritive diet is prescribed, and general cleansing instructions given.

(3) The pack is removed after 6 or 7 days and the area sprayed to remove any debris. It should now be possible to see the crown of the unerupted cuspid at the apex of the cone-shaped opening in the palate.

(4) A final examination should be made several days later at which time the cone walls will be fairly well epithelialized. The patient is now referred to the orthodontist for continued treatment.

Comments

1. The type of operation described is not difficult, lengthy, or trying for the patient. It must be completed, however, with considerable care to avoid trauma and injury to the adjacent teeth, especially the lateral and central incisors.

2. There is little postoperative discomfort.

3. The patient is usually motivated to cooperate by the knowledge that a useful procedure is being performed.

4. Eruption of the cuspid using the described method of choice is achieved in weeks where other methods take months and sometimes never produce results.

5. The patient and the parent are pleased because the cuspid tip can immediately be felt and seen.

6. Orthodontic comment has been favorable where this method has been used. It would appear that this method of exposing the cuspid crown is the method of choice in aiding eruption of the unerupted palatally displaced cuspid.

1011 *Lake Street* (R. A. A.)
Government Medical College
(S. J. V.)

Apples and Dental Health

GEOFFREY L. SLACK, D.D.S., and W. J. MARTIN, D.Sc.

Comment

The action of the apples appears to be twofold: (1) The low pH of the apple stimulates salivary flow, which is also increased by the mastication of the fibrous apple fragments. (2) The mechanical cleansing action of the apple sweeping over the teeth and gingival tissue in the presence of increased saliva flow removes debris and stimulates the tissues.

Results Encouraging—This investigation has been to test the effect of the use of apples in reducing dental disease. The results which have been obtained are encouraging and would appear to justify the setting up of a large scale study for a much longer period of time.

Type of Apple Preferred—It is important to emphasize that only apples that have crisp firm flesh can be considered as an aid to oral hygiene. If it were possible to produce some material that had all the qualities of the ideal apple a serious variable would be eliminated. At the present time, however, a crisp juicy apple is the best available.

Summary

(1) Certain types of apples having crisp firm flesh have been tested in the control of dental disease.

(2) The gingival condition of the children was significantly better in the apple group than in the control group.

(3) The effect on reducing the incidence of dental caries was encouraging though the small numbers of children and the possible higher susceptibility of the children in the control group make it necessary to exercise caution in interpreting these results.

(4) The results of this pilot study lasting two years indicate that a large scale study for a longer period would be worth while.

Adapted from *British Dental Journal* **105**:No. 10, pp. 366-371 (November 18) 1958.

The EDITOR'S *Page*

EVERY human being is a biologic variable. Some persons require more food than others. The sleep requirements vary. Exercise is necessary to all human organisms, but the amount is not constant from one person to another. The susceptibility and immunity to disease is one of the greatest variables. As dentists our interest in fluoridation requires us to look at the variations in fluid intake from one child to another. We should start with the premise that all children do not drink the same amount of fluoridated water.

In an important study made at the University of Queensland (Australia) Kruger reports: "The bulk of fluid intake values cluster around the mean in a fairly narrow range. As Crosby and Shepherd (1957) point out, if the fluoride level were selected to match the mean intake range, there would be a number of children who would not receive the optimal benefit from fluorine: at one tail there would be an inadequate intake of fluorine because of a lower water consumption, while at the other tail there would be some who would be consuming at least twice the optimal amount of fluorine."[1]

This statement means that the child who drinks too little fluoridated water at the constant concentration of 1 part per million does not receive the protection against caries that is desired. The child who drinks too much water may be in danger of objectionable mottling of the enamel. This, however, is unlikely.

The child who drinks milk and soft drinks in large amounts may not take enough water. He is not, therefore, receiving the proper protection from the fluoride. In Australia the tea drinking among children increases the fluoride intake. This is not a common practice among children in the United States.

The mean daily temperature is also a factor that must be considered in fluoridation. With higher temperatures the intake of water is likely to be increased. It would, in that case, be necessary to reduce the fluoride level in the community water supply as the temperature rises. Kruger suggests the following adjustments:

Mean maximum temperatures (degrees Fahrenheit)	*Recommended optimum fluoride concentration* (parts per million)
50.0 - 53.7	1.2
53.8 - 58.3	1.1
58.4 - 63.8	1.0
63.9 - 70.6	0.9
70.7 - 79.2	0.8
79.3 - 90.5	0.7

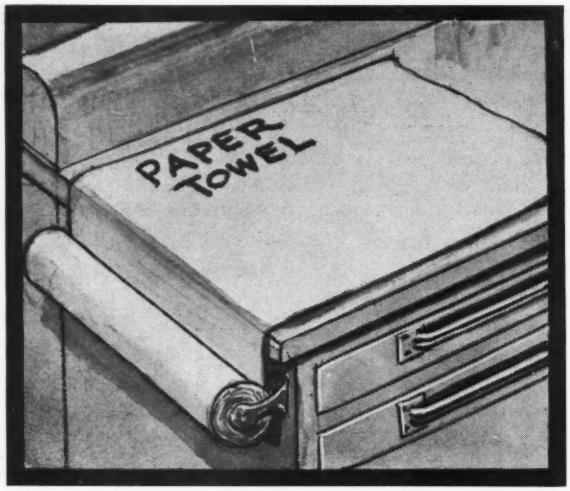
The United States Public Health Service estimates: "Since, however, a sizable portion of the United States population does not have access to municipal water systems only about one-third of the Nation may benefit from this fluoridation control measure. Further concern is related to the fact that about 60 per cent of the U.S. population does not avail itself of existing dental services, and that the number of practicing dentists is not keeping pace with population growth. In spite of the $1.7 billion expended last year for dental services, the Nation's steadily accumulating dental needs remain several times greater than those currently being met. Accordingly, a supplemental caries prevention program is needed and dibasic calcium phosphate [incorporated in flour for baking bread], as well as other dietary additives, might provide partial solutions to the problem."[2]

In addition to the fluoridation of water supplies, the topical application of fluoride salts, and the incorporation of dibasic calcium phosphate in bread, the National Institute of Dental Research is exploring a method of applying protective coatings to enamel: "Considerable interest has been shown in the topical application of the long chain aliphatic amines and silicone compounds to produce a durable and invisible microfilm and thereby reduce the adhesion of dietary foodstuffs serving as substrate for oral microorganisms."[3]

Whatever method we use to control dental caries (including dietary prohibition of refined sugar) we may expect to come face to face with biologic variations in one form or another.

[1]Kruger, B. J.: The Fluid Intake of Under Eight Year Old Queensland Children, University of Queensland Papers, The University of Queensland Press (June) 1960.
[2]Highlights of Progress in Research on Oral Diseases, U. S. Dept. of Health, Education, and Welfare, Public Health Service, 1960, p. 5.
[3]Highlights of Progress in Research on Oral Diseases, U. S. Dept. of Health, Education, and Welfare, Public Health Service, 1960, p. 6.

Clinical and Laborator



1

Cover for Instrument Cabinet

Leonard M. Hendricks, D.D.S., Houma, Iowa

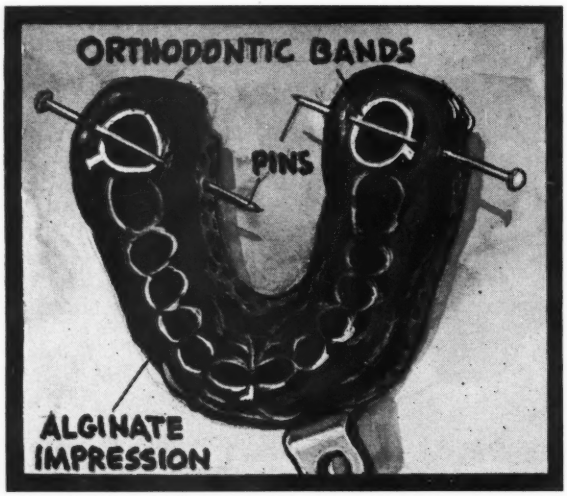
1. Attach a roll of paper toweling to the side of the instrument cabinet. This covering is changed after each patient.

2

Replacement of Glass Spray Bottle Tube

Mary E. Wooden, R. N., Jacksonville, North Carolina

2. The broken glass suction tube on a spray bottle may be replaced by a section of plastic tubing and the needle hub adapter from an intravenous infusion set. Threads will be cut into the soft plastic hub as it is turned into the hole in the spray bottle cap.



3

Stabilization of Orthodontic Bands in an Impression

Max R. Tarmann, D.D.S., Milwaukee, Wisconsin

3. Place pins through the alginate impression material to hold the orthodontic bands in proper position.

READERS *are Urged to Collect $10.00*

For every practical clinical or laboratory suggestion that is usable, DENTAL DIGEST will pay $10 on publication.

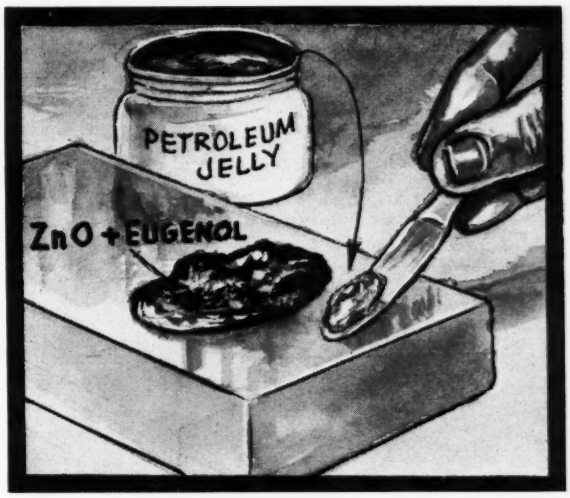
You do not have to write an article. Furnish us with rough drawings or sketches, from which we will make

SUGGESTIONS . . .

Temporary Cementation

Stewart Stempel, D.D.S., Brooklyn, New York

4. When using a temporary zinc oxide-eugenol cement, incorporate one-quarter of an inch of petroleum jelly into the mix. This will facilitate removal of the appliance.

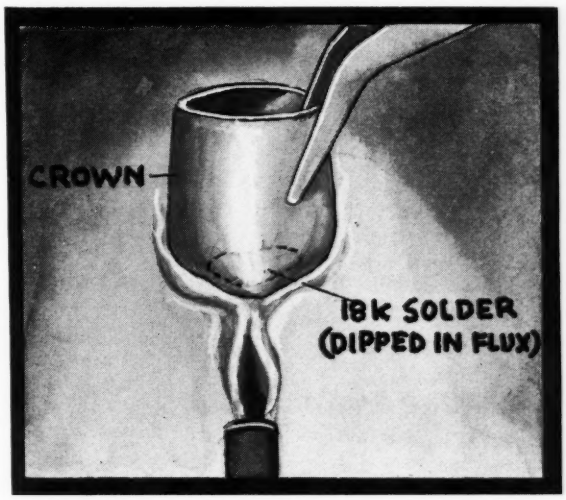


4

Reinforcement of a Shell Crown

William L. Peecook, D.D.S., Hartsdale, New York

5. Place an 1/8-inch square of 18 karat solder in the cusp portion of a gold shell crown. Hold the crown over a Bunsen flame to melt the solder. This added thickness will strengthen the occlusal portion of the crown.

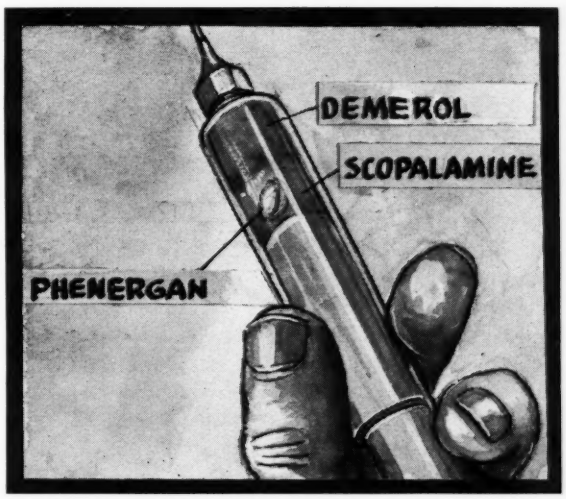


5

Combining Drugs for One Injection

Ivan T. Shaurette, D.D.S., Phoenix, Arizona

6. Combinations of premedication drugs, when they are indicated and compatible, may be put in one syringe.



6

suitable illustrations; write a brief description of the technique involved; and jot down the advantages of the technique. This shouldn't take ten minutes of your time. Turn to page 36 for a convenient form to use.

Send your ideas to Clinical and Laboratory Suggestions Editor, DENTAL DIGEST, 708 Church Street, Evanston, Illinois.

MEDICINE and the Biologic Sciences

Skin Diving—Problems

Skin divers wear face masks and flippers and generally do not use air lines extending to the surface. The divers rely on breath holding or carry a self-contained supply of oxygen or compressed air. There are increasing numbers of skin divers. As a result of disregarding proper safety precautions, the incidence of accidents is mounting.

Each gas in a mixture exerts pressure independently of the other gases and the solubility of the gas in the body fluids depends upon the partial pressure. Nitrogen dissolves readily at increased pressures. During rapid decrease of pressure, nitrogen is released from the tissues faster than the gas can be carried to the lungs. Bubbles may form in the blood stream, obstruct capillaries, and cause local tissue anoxia. The result is decompression sickness, also called caisson disease and the bends.

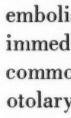
The face mask fits tightly over the eyes and nose but does not cover the mouth. For deep dives, a self-contained underwater breathing apparatus is strapped to the back. The open-circuit type consists of a flask of compressed air. Air is delivered through a demand regulator, by a tube in the mouth at the exact pressure of the surrounding water. Expired air is exhausted through a separate tube. In the closed-circuit type, unused oxygen is rebreathed after a soda-line canister removes carbon dioxide. A pure oxygen flask replaces the volume lost. At depths greater than 33 feet, pure oxygen is not safe and may cause tingling, irritability, nausea, twitching, and convulsions.

The greatest hazards in skin diving are equipment failure, panic, and pressure effects. Decompression sickness occurs less often in skin divers than in commercial suit divers because the limited air supply prohibits prolonged submersion at great depths. However, careless divers carry extra flasks and return to the surface only to make an air change. Since nitrogen absorption is cumulative, the danger of bubble

formation is increased by repeated descents within one day.

Nitrogen narcosis causes euphoria and irrational behavior. Panic also may lead a diver to remove the mask or breathing tube. Failure to expire during rapid ascent may result in air embolism, which should be treated by immediate recompression. Usually the commonest medical problems are otolaryngologic disturbances which are not serious as a rule.

Fields, J. Allan: *Skin Diving, Arch. Otolaryng.* **68**:531-541 (*November*) 1958.



Aspiration Pneumonia

Pneumonia may be caused by aspiration of oil, food or gastric secretions, foreign bodies, or infected material from the mouth and throat. These types of pneumonia should be especially considered in persons with swallowing or laryngeal disorders and in alcoholics.

Pneumonitis due to inhaled material usually affects the portion of the lung that is most dependent at the time of aspiration. Chronic suppurative disease, irreversible emphysema, and fibrosis and *cor pulmonale* may ensue.

The deposition of oil in the lungs depends almost entirely on mechanical factors. Usually, the posterior basal divisions of the lower lobes are affected and the condition is bilateral. The oil induces a foreign body reaction in the alveolar spaces. Mineral oil taken orally, oily nose drops, and tracheotomy lubricants may be aspirated. Diseases that interfere with cough, palatal, or swallowing reflexes predispose to aspiration of mineral oil.

Most patients have no signs or symptoms even with extensive pulmonary involvement, and the disease usually remains undetected until postmortem examination. Some patients have a chronic, occasionally productive cough and recurrent bronchopneumonia. Dyspnea and hacking cough occur as fibrosis progresses because of continued use of oily substances.

Aspiration of gastric contents is a hazard in vomiting postoperative patients, intoxicated persons, and subjects with head injuries or metabolic coma. Initial acute bronchial obstruction and generalized pulmonary edema may cause sudden death. Foreign body reaction leads to fibrosis and chronic bronchial obstruction.

The pathologic changes in the lung depend upon the site, the chemical and physical characteristics of the foreign body, and the time elapsing before the object is removed. Smooth nonobstructing metal pieces cause no reaction. Rough metal pieces producing obstruction and corrosion provoke a local inflammatory reaction and mucosal swelling. All vegetable substances irritate the mucosa and cause diffuse changes. Organic objects, such as bones and teeth produce symptoms of chronic pulmonary disease with clubbing of digits after many months or years.

Aspiration of infected material from the teeth or tonsils may produce a lung abscess or a less severe pneumonitis which is usually diagnosed as viral, lobar, or bronchial pneumonia. Poor dental hygiene and conditions that depress the gag reflexes are etiologic factors. The roentgenograms show that the disease is confined to a

specific segment of the lung tissue.

No treatment is specific but the pneumonia will resolve if the source of aspiration is eliminated in time. Resection may be necessary for patients with secondary bronchiectasis or recurrent bronchopneumonia.

Besman, Irvin R., and Lyons, Harold A.: Aspiration Pneumonia, Dis. Chest **35**:6-21 (*January*) 1959.

Osteomalacia

Bone forms when protein-rich matrix produced by osteoblasts is calcified by precipitation of calcium phosphate. Osteomalacia occurs when calcification is inadequate due to relative deficiency of calcium or inorganic phosphate. These deficiencies may result from poor diet, lack of sunshine, faulty intestinal absorption, renal tubular defects, and corticosteroid therapy.

Dietary lack of vitamin D impedes absorption of calcium and, perhaps, phosphate from the intestine. Osteomalacia is most likely to develop if shortage of vitamin D is accompanied by a condition that promotes calcium depletion, such as pregnancy or lactation.

Lack of sunshine may also lead to osteomalacia since vitamin D is formed by the action of ultraviolet rays on the 7-dehydrocholesterol of the skin. Even if the diet is deficient in calcium, sufficient exposure to sunlight may prevent development of osteomalacia. Sprue, chronic pancreatitis, regional ileitis, impaired bile production, or transport and intestinal shunts all may interfere with the absorption of vitamin D and calcium by the small intestine.

Disturbance of renal tubular function may prevent sufficient reabsorption of inorganic phosphate. The resulting osteomalacia is not amenable to vitamin D therapy. Congenital tubular dysfunction, chronic pyelonephritis, and sulfanilamide toxicity may cause excessive excretion of calcium or phosphorus. Disturbed tubular reabsorption of calcium also impairs skeletal calcification.

Prolonged corticosteroid therapy may produce osteoporosis or ostemalacia. The cause of these skeletal abnormalities is related to protein catabolism and increased urinary excretion and intestinal loss of calcium.

Skeletal abnormalities caused by calcium depletion include thinning of cortex of long bones, deformed pelvis, and vertebral anomalies. Before calcium depletion becomes extreme, however, damage is often limited to slit-like or band-shaped radiolucencies of bones. These local pseudofractures may be seen in the pelvis, femurs, ribs, radii, ulnae, and metatarsals.

Biochemical abnormalities are few in number. Serum calcium and phosphorus are normal or decreased. Serum alkaline phosphatase is usually elevated.

Treatment of osteomalacia varies with the underlying cause. Vitamin D deficiency is corrected by administration of 2,000 to 10,000 units of the vitamin a day. An adequate supply of calcium is provided by a quart of milk a day.

Buchem, F. S. P.: Osteomalacia, British M. J. **5127**:933-938 (*March*) 1959.

Peripheral Nerve Injuries

The peripheral nerves may be injured by division, compression, ischemia, stretching, or concussion. The large motor nerves are more often damaged than the small sensory fibers. Since most fibers with large diameters innervate voluntary muscle, paralysis is generally more severe than sensory loss.

Regeneration usually takes place if the sheath is intact or the ends are close together. Separation of the ends of the myelin sheath requires operation. After surgical repair some distal, finely coordinated movements may be retarded or inhibited.

If faradic current applied over a paralyzed muscle elicits a contraction, the nerve is intact. If no response is obtained with faradic current and galvanic current elicits a contraction, the nerve is degenerated. The muscle contracts with slow wormlike movements. A fibrosed muscle will not contract.

More complex tests allow differentiation of degenerating, degenerated, and regenerating nerves. Serial measurements permit prediction of recovery six to eight weeks before voluntary muscle function returns. The recovery period can be estimated if the site of injury is known. Nerves regenerate at the rate of 1 to 3 millimeters per day.

Early operation is necessary if a nerve is avulsed or severed. The part is immobilized to keep tension from the sutures and the limb must be handled gently. Functional splinting is used to keep the stronger muscles stretched while the antagonists are weak. The splints are removed several times daily for physical therapy, including passive motion of the distal joint.

Facial paralysis is the most frequent cranial nerve disease treated by physical therapy. Pain is common and may be relieved by warm compressed or luminous heat. Smiling and laughing overstretch the weak muscles and should be discouraged. Adhesive splints can keep the corner of the mouth upward. Gentle stroking massage against gravity provides passive exercise. Electric stimulation is applied three times a week. Recovery takes two weeks to six months.

Boyle, Robert W.: The Physical Treatment of Peripheral Nerve Injuries, Minnesota Med. **42**:417-423 (*March*) 1959.

Food Allergy

Food allergy is an exaggeration of the immune response to foods mediated by an antigen-antibody reaction. The gastrointestinal tract is the most common shock organ but any tissue in the body may be affected.

Allergic reactions in the gut include mucosal edema, hyperemia, hyperactivity of the intestinal and mucosal glands, and vomiting. Symptoms are diverse and include swelling of the lips and buccal mucosa, vomiting, abdominal pain, diarrhea, pylorospasm,

pruritus ani, mucous colitis, and rectal bleeding.

Food allergy may also cause rhinitis, asthma, dermatitis, and occasionally systemic reactions. Respiratory symptoms may be provoked by inhalation of minute food particles. Rarely, absorption of a food through the skin produces a reaction.

The duration of food allergy is variable. Sensitivity may persist for life, especially with nuts and fish, but more commonly wanes if further exposure is avoided. The incidence of food allergy decreases with age.

Evidence of a true antigen-antibody reaction is essential to establish a diagnosis. Typical atopic symptoms, such as rhinitis, asthma, and urticaria after food ingestion are proof of an allergic reaction. A personal and family history and gastrointestinal roentgenograms are sometimes helpful. Eosinophilia in the blood, sputum, or nasal secretions may confirm the diagnosis.

Skin tests are not always reliable but may reveal the responsible food. Eggs, milk, fish, wheat, and legumes are the commonest allergens. Cross-sensitivity to related foods should be considered regardless of the outcome of cutaneous tests. Food contaminants may be important allergens. Penicillin may appear in milk after treatment of cows. Dyes used in food coloring, preservatives, and pesticides may be transmitted in food and provoke allergic responses.

Diagnosis of food allergy is not definitely proved if symptoms disappear when a food is withdrawn and recur when the food is again introduced. Not all intolerance to food is due to allergy. Cheilitis, for example, occurs in patients with a below average threshold to nonantigenic irritants in celery, oranges, spinach, or other food.

Psychologic factors in food allergy have been overemphasized. If the offending food can be identified, removal from the diet is the preferred treatment. Food fads should be discouraged, for overfeeding of citrus fruits, wheat germ, or carrots may produce hypersensitivity.

Fries, Joseph H.: Factors Influencing Clinical Evaluation of Food Allergy, Ped. Clin. North America **6**:867-880 (*June*) 1959.

Bruxism and Chronic Headache

RAGNAR BERLIN, M.D., and LEOPOLD DESSNER, L.D.S., Falkoping, Sweden

Study Extended

In some cases of chronic headache without apparent cause dysfunction of the temporomandibular joints has been demonstrated. Such headache is believed to be of muscular origin; and the study has not been extended to bruxism.

Definition—Bruxism is defined as a habitual unconscious clenching or grinding of the teeth to no physiologic purpose. This gradually results in permanent overstrain of the masticatory muscles. It is commonest during sleep but may be noticed during the day when the patient is concentrating on some trying work, particularly when he is upset or irritated.

Isotonic Activity: In muscle physiology a distinction is made between isotonic or dynamic activity, and isometric or static activity. In isotonic activity the perpetual alternation between contraction and relaxation stimulates the circulation of blood in the muscles even when the movements are small.

Isometric Activity: Where muscles are used as stabilizers or positioners their isometric activity imposes a constant strain on the entire muscle; having less opportunity for rest and recovery, the fibrils are more easily exhausted. Such isometric activity is well seen in the muscles of mastication when the teeth are tightly closed.

Contributing Factors to Headache: The hypertonic state of the muscles when the jaws are pressed together, either consciously or unconsciously, soon produces a progressive ischemia, with impairment of oxygenation and accumulation of metabolic products. As a result, the sensory nerve-endings are gradually stimulated, causing pain. In addition the hypertonic muscles pull on the tendons and supporting tissues.

Progressive Ischemia: All these factors may contribute to the pain which arises in the spastic muscles of the stomatognathic system and is felt as headache.

Local Causes of Bruxism—Bruxism implies long-standing osometric muscle activity leading to a spastic condition within the masticatory muscles. The local factors causing bruxism include various disturbances in the bite, such as (1) premature occlusal contacts, (2) interferences in gliding movements, and (3) closed bites.

Psychic Factor May be Present—Muscular dysfunction due to bite disturbance can often be compensated for by neuromuscular adaptation. To elicit bruxism some additional factor is necessary, and this would seem to be psychic. Bruxism is certainly commonest in people who are under emotional tension.

The case history is valuable in diagnosis. The patient usually wakes up with a headache and he will often admit to experiencing tenderness in the teeth and/or in the masseter and temporal muscles. Diurnal bruxism is likely when the headache grows worse during the day or after a period of exacting work or mental stress.

Diagnostic Measures

Symptomatic Signs—1. The diagnosis of bruxism is obvious if the patient is seen to be clenching his teeth at intervals, or if the masseters are noticed in rhythmic contraction. If neither of these signs is observed, others must be sought.

2. It is usually possible, with the patient's teeth in tight occlusion, to palpate hypertrophic and tender mas-

(*Continued on page* 39)

Contra-Angles

Forty Million Families and Their Health

THE "great debates" are over. A new President has entered the White House. He certainly will be required to deal in strength with the tense foreign issues. He must remember, however, that a vigorous foreign policy will mean little if pressing domestic affairs are slighted.

One of the first things that President Kennedy should do is to look at the actual income of America's 40 million families. This test of the economic health of the Nation should determine what domestic programs should receive priority. Should taxes be increased or decreased? Should there be more spending or less for public works. What is the status of education? Of the health of the public? Are we really an "affluent society?"

Before the new President and the Congress are too far committed to costly programs they should study the income status of the 40 million families of the Nation.

Here is the situation as seen and described by the authoritative and independent *Economic News*:

"Several significant features merit emphasis:

"1. The top one-sixth of America's 40,000,000 families, measured by income left after Federal income taxes, had an average monthly income of $857 ($198 per week).

"2. Five-sixths of all families, more than 33,000,000, had incomes ranging from $612 per month ($141 per week) for the most prosperous 5 per cent, down to $100 per month ($23 per week) for the least prosperous 3.8 per cent of all families.

"3. More than half of 40,000,000 families had less than $400 per month ($92 per week).

"4. About one-fourth, 24.7 per cent or nearly 10,000,000 families, had less than $260 per month ($60 per week).

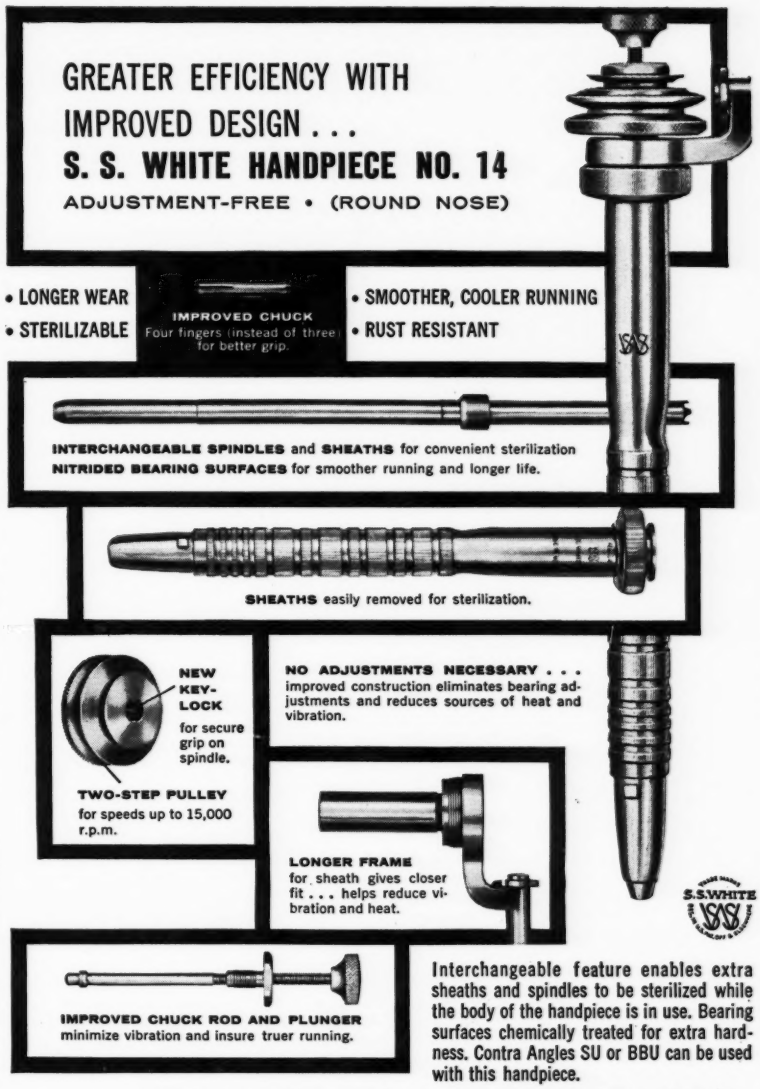
"5. Nearly one-seventh of American families had less than $200 per month. For families in this group that included 2 adults and 3 children, the income per capita averaged only $36.60 per month ($8.45 per week).

"Such are the facts. Readers can judge for themselves how 'affluent' America's 40,000,000 families are. Knowing your own expenditures, you can readily judge the circumstances of at least those immediately above and below your own group in the table. We believe that the following conclusions are justified by the facts shown:

"a. More than half of all the families in the United States do not have enough income left after taxes to save for their children's higher education without sacrificing some features of decent living.

"b. This half of America's families have no margin facilitating saving for emergencies such as serious illness.

"c. At most, only 20 per cent of America's families can hope to accumulate savings on a scale sufficient to cover both higher education for their children and family emergencies. Only a small portion of this fortunate 20 per cent can be called 'affluent' in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CLINICAL AND LABORATORY SUGGESTIONS

(*See page* 28 *and* 29)

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that they have a comfortable margin of income over all foreseeable needs . . .

"Many people apparently do not realize that we tax a young man who is earning his way in college about 10 per cent of his earnings. In view of the urgent need for maximum education of our youth, this situation is a disgrace to the Nation. The combined effects of increasing the personal exemption to $900 and allowing all tuition payments as deductions from income before taxes would eliminate the taxation of virtually all young people who are earning their way through college."

During the Presidential campaign there was frequent comment on health care for the American people, notably those past 65. One suggestion that was *not* made: *all expenses for health care for everybody should be deductible from federal income tax.*

If all expenses were deductible people would spend more money for all types of health care. That means that people would keep in better health for a longer time and thereby earn more taxable income over the years. If business expenses (some of which are often extravagant) are deductible to keep a business enterprise solvent and tax paying certainly *all* expenses to keep the human organism in optimum condition should be deductible.

This suggestion may appear to be special pleading because it is printed in a journal for dentists who would profit from a program of more extensive health care paid out of *private* funds. Dentists would have increased earnings. They would also pay more taxes. Physicians, nurses, pharmacists, and all auxiliary personnel in the health fields would also have higher incomes and pay more taxes.

Realism requires us to concede that there are at least three definite hazards to a system in which *all* costs for health care would be deductible from federal income tax:

1) Are there enough dentists, physicians, nurses now available to meet the increased demand?

2) If there is a scarcity of personnel is there a danger that the cost of health care would be increased because of the greater demand?

(*Continued on page* 38)

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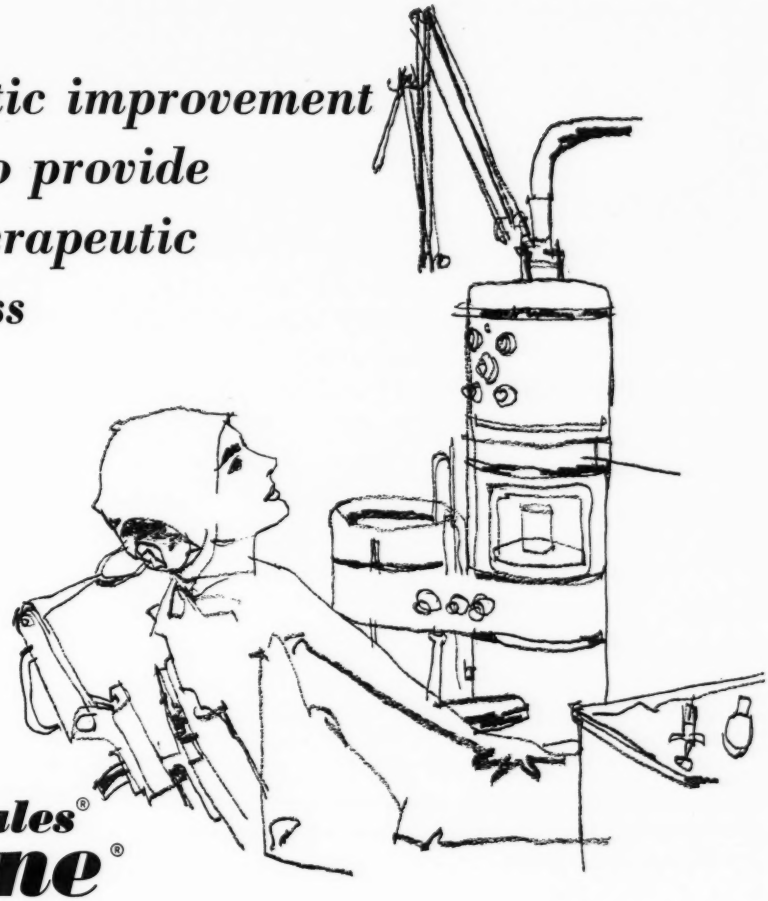

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1. Stephens, V. C., *et al.*: J. Am. Pharm. A. (Scient. Ed.), *48*:620, 1959.
2. Kuder, H. V.: Clin. Pharmacol. & Therap., in press.

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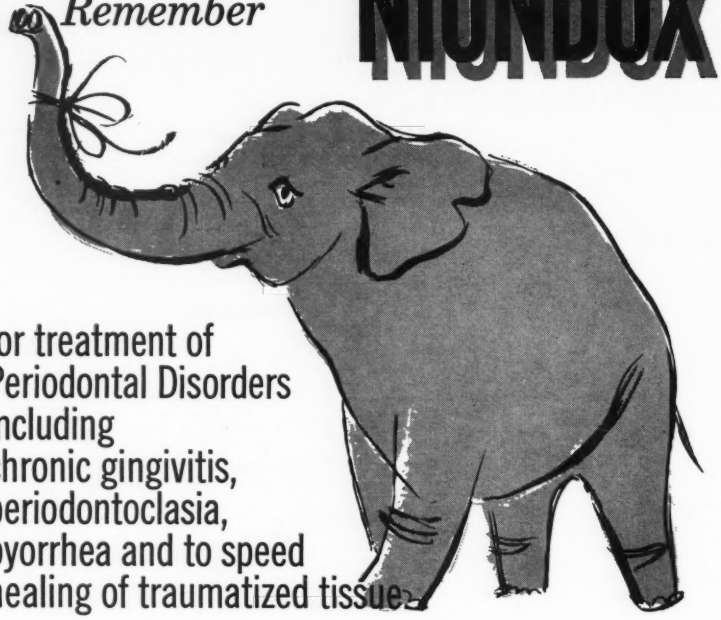

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References:

1. Toff, J. W., Internat. Den. Congress, Venice, Sept. 5-11, 1955.
2. Wellensich, E. K., Texas Dental Journal, 62:259 (1956).
3. Ibid.

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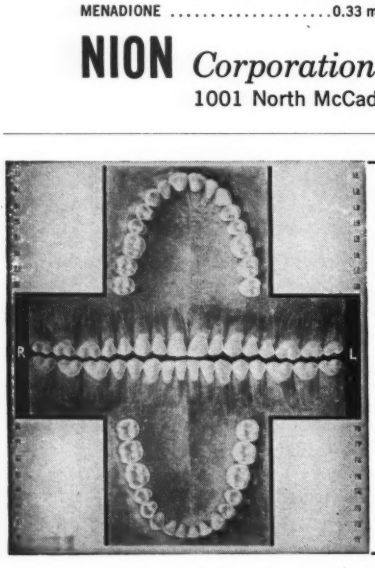

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3) What safeguards could be erected to prevent cheating on tax returns by the recipients of the care and by those who supplied the services?

Supply: There are probably not enough personnel available at present and the supply is not evenly distributed to meet the increased demand for services. This condition could be remedied, in part, by the proposal made in *Economic News*: to encourage young people to enter professional fields full deductions for all tuition and education costs should be allowed from income tax.

The crisis in distribution of personnel is more complex and greater incentive must be offered for practitioners to locate in rural areas.

Cost: To prevent "inflation" of dental and medical costs (because the demand for services would exceed the supply of personnel for a time) a stabilization and control of fees would be necessary. A voluntary method of "price control" would be preferred if it would work. This would be a real test of the integrity of professional people.

Cheating: Here is a real danger. People who "forget" to declare income from dividends and interest are usually the same people who claim generous expense deductions for themselves. There are also people who "forget" to declare all their income from business or professional sources.

If full deduction for all health care were allowed we might expect some people to claim expenditures that they did not actually make and there would be some dentists and physicians who did not declare all their income.

One safeguard to prevent such cheating and fraud would be to require that every dentist and physician give a receipt for professional services on a standardized and duplicate form that would allow cross-checking by the Internal Revenue Service.

We may expect that with the increasing use of electronic computers cross-checking audits will be used on most tax returns for dividends, interest payments, miscellaneous income, and for deductions. The "electric brain" will make fraud in tax returns easier to discover.

These changes that are suggested in

the federal income tax laws are certainly not the full answer to the pressing problems of adequate health care for all our people. Full deduction for health care would stimulate more people to seek and to pay for health care on a *voluntary* basis. It is one and only a part answer to a compulsory system of "state medicine."

The emphasis on health problems during the Presidential campaign demonstrates that the subject is of major importance in our domestic economy. It should continue to receive study by our new President and the Congress. The demand by the public for such a study and for a solution will increase. The subject is vital to our national welfare.

A healthy Nation is a happier one, a more prosperous one, and one better able to defend itself.

—E.J.R.

Bruxism and Chronic Headache

(*Continued from page* 32)

ticatory muscles, and there is often tenderness along the zygomatic arch.

3. The lower jaw cannot be relaxed to the normal extent, and the freeway space between the upper and lower jaw (normally 2-3 millimeters) is reduced to 0-1 millimeter. Usually, because of the longstanding grinding of the teeth, atypical attrition facets can be found, particularly on the cuspids and bicuspids.

Justifiable Diagnosis — A tentative diagnosis of bruxism is justifiable when the history reveals the characteristic features mentioned and when no other cause can be found for the patient's symptoms.

Description of Pain—The pain is usually felt as a dull pressing headache, situated toward the front, behind the eyes, in the temples and vertex, along the origin of the masseter on the zygomatic arch, and sometimes along the occipital insertion line of the trapezius. Now and then, the headache appears unilaterally, as in migraine but without the neurologic disturbances of this condition and without vomiting.

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Series of Cases Studied

Every other common cause of headache had been excluded in the cases studied. The diagnosis was made on the typical history and in most cases also on the signs mentioned; but the 62 patients treated (51 women and 11 men) included some in whom the condition was strongly suspected rather than proved.

General Development—In most patients the headache had developed gradually usually between 15 and 30 years of age. (60 per cent of them were within this age range). 80 per cent had had headache for more than a year, and 50 per cent for more than five years.

Relief Temporary—Most of them had already consulted several physicians without gaining more than temporary relief.

Treatment

The aim of treatment is to break the vicious circle by making it impossible for the patient to clench his teeth. This can be done with a special "relaxation" plate. The purpose of this appliance is

(*Continued on page* 40)

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to open the bite anteriorly by inserting a bite plane between the upper and lower incisors, thus increasing the intermaxillary space. Though other appliances have been used by other workers, their purpose has been mainly to protect the teeth and periodontal structures. Dessner's plate designed in 1959, used throughout the investigation, is intended to influence the neuromuscular disturbance. It breaks the muscular hyperactivity, eliminates the vicious circle, and reestablishes the normal tone of the masticatory muscles.

Requirements of Appliance—1. It should take up as little space as possible; and be handy and light.

2. It should not encroach on the soft tissues such as the lips and cheeks.

3. It should prevent the posterior teeth from being clenched together.

4. It should help to reestablish normal tonus and a relaxed rest position.

Length of Time Required — The plate is to be worn during the night and when indicated, during the day. It is worn regularly for at least six months; that is, for at least four to five months after the disappearance of the headache, which usually takes place within four to six weeks. After treatment the patient is advised to use the splint occasionally should the headache return. If the headache does not diminish within three months, success is unlikely.

Results of Treatment

A summary of the results shows that of the 62 patients included in the series, 42 (68 per cent) were completely cured in one or two months and 12 (19 per cent) were considerably improved and were only occasionally troubled by this type of headache. Six (10 per cent) were only slightly improved and 2 (3 per cent) were not improved. Thus the treatment was successful in 87 per cent of the cases.

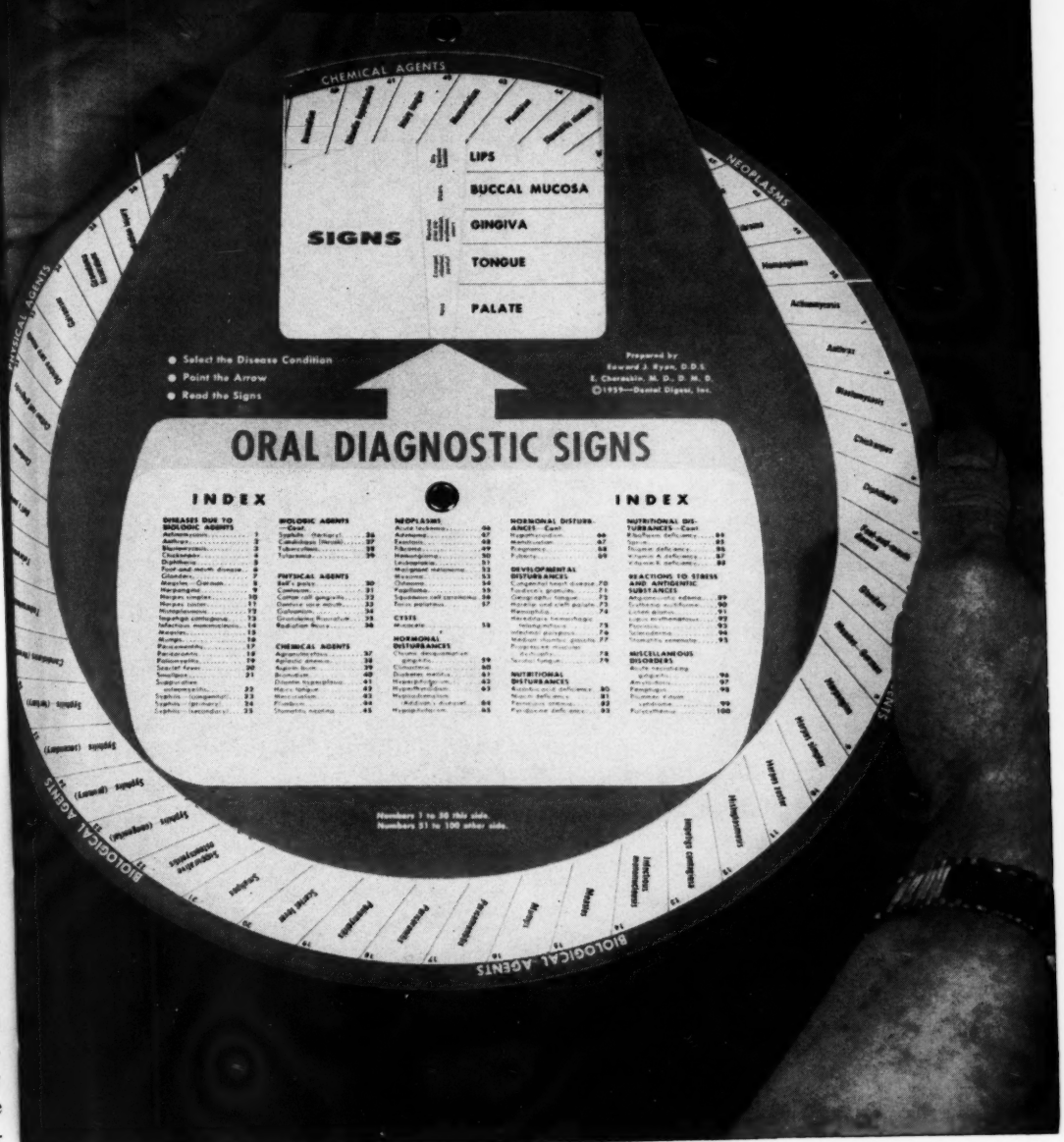
Duration of Results—The results remained essentially unchanged for up to three and a half years. Only 4 cases out of 55 treated continuously with the relaxation plate had regressed slightly.

Control Method — Some patients served as their own controls: (1) After the primary investigation and diagnosis, a "pseudo-plate" was constructed, which had no anterior bite plane and could have no possible therapeutic value. (2) This pseudo-plate was worn by 7 patients every night for one or two months. After that length of time none of the 7 had been relieved of their headache, nor had they improved in any way. (3) At the end of this control period they were fitted with the therapeutic plate and told to wear it every night for one to two months. They were not seen until they returned for reexamination, when it was found that 5 were completely free from headache, 1 was considerably improved, and 1 unchanged.

Discussion

The association of bruxism with chronic headache has received little attention. Reviews of bruxism as an expression of general psychic insufficiency have appeared in dental journals.

(*Continued on page* 44)



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4. Neoplasms
5. Cysts
6. Hormonal Disturbances
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8. Nutritional Disturbances
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Bruxism and Chronic Headache

(*Continued from page* 40)

Relaxation Important—The importance of teeth-clenching in the development of headache has been stressed and the possibility of relieving the headache in suitable cases by general relaxation exercises has been suggested. The role of muscular dysfunction in the causation of various pain syndromes, including headaches has been mentioned.

Apart from these earlier opinions nothing has been published about this special type of chronic headache, and no lasting therapy has been employed. Stress must be made on the necessity of relaxation. Some cases of bruxism with headache may be cured by advising general relaxation. It is thought, however, that such general relaxation is more likely to be attained once the strained masticatory muscles are relaxed, the pains disappear, and the patient becomes less disturbed. The method described here, therefore, usually gives more rapid and reliable results than general relaxation therapy.

Resting Pattern Absent—The presence of muscular hyperactivity in bruxism has been proved in several electromyographic studies. That the temporal muscle seems to be the postural muscle of the mandible and that the masseter and pterygoid muscles are active only in stronger occlusion has been noted. The pattern of pain distribution in temporomandibular dysfunction has been studied by one investigator. In patients with this condition and with occlusal disturbances he found absence of a true resting pattern in the electromyogram of the masticatory muscles. After balancing the occlusion in these cases, or after occlusal splinting, the pains disappeared and the final electromyogram indicated no muscular activity discharges at rest.

The present control material provides a proof that there is no suggestibility factor of any significance at work in this type of therapy. The long-term response indicates that the effect will usually be permanent. Muscle-relaxing treatment is believed to be an effective means of handling cases of chronic headache caused by bruxism.

Summary

Bruxism (gnashing, grinding, or clenching of the teeth) is often associated with chronic headache. This is a result of hyperactivity of the masticatory muscles.

Sixty-two cases of chronic headache secondary to bruxism were treated with a "relaxation plate" which has a bite plane between the upper and lower incisors which prevents habitual clenching of the jaws. In 87 per cent of cases this treatment was successful; 10 per cent were only slightly improved, and 3 per cent were not improved.

In 7 cases the patient was treated initially with a "pseudo-plate" constructed without the "bite-raising" incisor plane. In none was there any improvement. When the proper "relaxation plate" was substituted, 6 out of the 7 patients showed a favorable response.

Adapted from *The Lancet* No. **7145**:289 (Aug. 6) 1960.